

December 6, 1965

NOTES 12/2/65 BALCH

9/8/12/7

12/10/65 file

B 12/7

MTF Combined Agencies Campaign was rather successful this first year. Over 90% of the 3,464 assigned personnel participated with a total contribution of \$41,933. Recipients were designated as follows:

Harrison County (Gulfport-Pass Christian)	\$13,007
South Pearl River County (Picayune)	8,844
Hancock County (Bay St. Louis)	8,751
Greater New Orleans (Slidell)	7,077
Int. Welfare and National Health Agencies	4,254

Average contribution of NASA, Weather Bureau and DOD was \$20.65. ✓

MTF Personnel Strength as of December 19 will attain 100 as a result of the 13 acceptances received from the offers made to 18 of the TDY Augmentation Personnel. ✓

A National Labor Relations Board hearing was held on Monday, November 22, concerning the petition for representation filed by the UAW. It was agreed between the UAW and North American Aviation, Inc. that the potential bargaining unit would consist of all technicians, inspectors, material stock clerks and truck drivers employed by S&ID and Rocketdyne MTF and Rocketdyne Michoud. It was also agreed that the election would be held on December 15 for employees in these classifications who were on board as of November 20. A pre-election meeting will be held in the office of the Personnel Supervisor on December 14, at which time the eligibility list will be furnished to the UAW. ✓

On-site assigned personnel as of December 1 was 736, including 447 relocations and 289 local hires. There were 55 visitors and 15 TDY personnel on site this date in support of MTF activities ✓

Delivery of Parts remains the critical problem in the completion of the S-II-T stage systems. In order to expedite S-II-T work, some parts are being removed from the S-II-F at Seal Beach and sent to MTF. The S-II-T Forward Bulkhead to Forward Skirt areas under the Membrane Seal has been X-rayed and the film processing completed in Downey. A review of the film by S-II Engineering disclosed the presence of a number of foreign objects trapped in the space beneath the seal. The location of each object has been identified by stringer and station location. The list, together with a recommendation as to the action to be taken in regard to each item, has been received at MTF and is being reviewed. A preliminary meeting with NASA/MTF personnel in regard to the action to be taken was held November 30. No decisions were reached as the meeting was primarily for review of the situation and other meetings were scheduled. ✓

Limit Notes to 1 Page -
JVS 12/7

B_{12/7} 2

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R&D OPERATIONS

CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
	SHEPHERD			
Nancy -	I want to			
see Underwood with this - when				

REMARKS

we receive the remarks from Aero-

4. BRAUN COMMENT

TO

NOTES 12-6-65
GEISSLER

WOULD LIKE TO
TALK TO YOU.

CODE	NAME J. Allen	DATE 12/13
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14 DEC 1965

December 10, 1965

MEMO FOR RECORD

Subject: Comments of Dr. Eggers at MSFC on December 3, 1965

Following are some comments which may supplement your own notes on this visit.

Technical Interchange between NASA Centers. Dr. Eggers made a strong, at-length pitch on the need for continuous in-depth, technical, contacts between working people among NASA Centers. "We must keep working on techniques to get real-time, person-to-person inter-action between the centers. A personal relationship is essential Years ago such a relationship was non-existent, and I do not believe the situation has improved. . . . For example, if you still have problems in the aerodynamics area, you should be talking to Ames, and today you are not talking to Ames." Mr. Weidner suggested that Dr. Eggers make a presentation to MSFC laboratory personnel about the need for inter-action among technical people in all the NASA Centers.

High Reynolds Number Facility. Dr. Eggers said that there are two ways to look at the need for this facility. First, the Saturn problems which this facility would attack are not pacing, and it is a reasonable risk to proceed with the Apollo program without such a facility. Second, the problem is critical and could cause failure of the Apollo program. If this is the case, NASA top management must take a look. Dr. Eggers believes the problem is not that critical.

Dr. Eggers was skeptical about the contribution of this facility to Apollo. Because it will be three years before we can get meaningful data from this facility, what will the facility contribute to the Apollo program? Saturn IB will fly with man before this facility is ready. What are we doing for IB in lieu of this facility? Is what we are doing enough to make us feel reasonably sure that we can man-rate the IB? What effect do these "stop-gap" measures have on Apollo hardware and operations? How worried are we, really, in areas such as reliability, structural integrity, payload penalty, etc.? We must have quantitative answers to these questions. We have never seen such quantitative answers. Nor have we seen how the IB is instrumented to measure some of the things this facility would measure. There is a void in the data needed to make a good case for this facility.

These are fair questions because we have had good success on launch vehicles in this country from a structural standpoint. Just what is it that is peculiar to IB and V that requires additional data in this area?

D-2
(A+)
copy to Mr.
Weidner
pfo-
OK-MC

If such a facility is required, is the one presented here the best facility we could build to work on these problems? We must think beyond Apollo and think of future programs as well. NASA has not addressed itself to this. It must be part of the presentation. This presentation should be made to the ART Centers. Dr. Seamans cannot resolve the need for this facility because technical people of equal competence have honest differences of opinion. Technical groups from the Centers must meet together and arrive at a common understanding of the problem and the alternatives for solution. The issue must be approached as a broad-based problem for future launch vehicles, and not merely as a facility to solve the immediate problems of Saturn V.

The problem is not getting the attention it deserves in ART. The presentation today is based on data developed many years ago. The Ames Center has moved on to other problems. Perhaps this subject warrants new attention, and we should get them back in the act. Dr. Eggers volunteered to be the focal point to get ART working on this again. He will personally take the matter up with Ames and Pearson.



Ray Kline

cc:

Mr. Gorman
Mr. Neubert
Mr. Shepherd
Mr. Weidner
Dr. Geissler
Mr. Dykes

December 7, 1965

MEMORANDUM FOR RECORD

Subject: Minutes of meeting, December 6, 1965, Re: Further action on High Reynolds Number Facility

ATTENDEES:

Mr. Maus, E-DIR
Mr. Newby, DEP-A
Mr. Cook, R-DIR
Mr. Richard, R-TO
Dr. Geissler, R-AERO-DIR
Mr. Jean, R-AERO-DIR

Mr. Dahm, R-AERO-A
Mr. Holderer, R-AERO-A
Mr. McNair, R-AERO-P
Mr. Bethay, E-T
Mr. Read, R-OM-PF

PURPOSE OF MEETING: To establish plans for the preparation of a presentation to Dr. Eggers and scientific personnel in his organization as requested by Dr. Eggers during his December 3, 1965, visit. The presentation should add quantitative values (how big are impacts in terms of dollars, schedule, reliability, weight reduction, etc.) to the qualitative presentation made on December 3, 1965.

DISCUSSION: The following points were agreed upon:

1. The proposed facility would have no impact on Saturn IB thru SA 212 or the earlier Saturn V flights. However, depending on how well the present schedule is maintained, Saturn V flights occurring from early CY 1969 on, could be impacted and some kind of quantitative values could be assigned to these impacts. This is also true of possible follow on Saturn IB program.
2. The value of the facility can definitely be shown with regard to Saturn V improvement and AAP programs, and it was agreed that a strong point be made of this.
3. It is mandatory that Dr. Mueller be convinced of the necessity for the facility, and a prerequisite to convincing Dr. Mueller is to get Dr. von Braun's strongest backing. This should result in a more receptive attitude by Dr. Eggers and OART and should be accomplished before the presentation to Dr. Eggers.
4. Because of the limited time available, (presentation should be made by mid-January), AERO will develop the necessary data and P&VE review and concurrence in the structural aspect of the report should be obtained.

ACTIONS ASSIGNED:

1. Dr. Geissler will arrange for preparation of the presentation utilizing primarily AERO personnel, but calling on Mr. Richard, Mr. Maus, and others, for specific support as required.

2. Mr. Cook will advise Mr. Cline of the effort and the need for P&VE review.
3. Mr. Weidner will advise Dr. von Braun.
4. Dr. Geissler will contact Dr. Eggers and establish tentative date for presentation.



P. C. Read

cc:

Attendees

R-DIR, Mr. Weidner

R-DIR, Dr. McCall

R-OM-DIR, Col. Fellows

CONCURRENCE:

R. W. Cook

*U/Bok
Dykes
Huth
stan only
copy sent to
Dykes + Huth
12-7-65*

(H)
1-19-66
Jh

NOTES 12-6-65 KUERS

1. IU-500-S: Reference NOTES of Mr. Grau 11-15-65 (copy attached). For clarification, the following information is offered:

a. In the early development phase of stages, we have always to telescope our activities of design, fabrication, and testing. There will never be a delivery of a first vehicle without shortages or outstanding design changes.

b. The shortages of this Unit were well known and discussed prior to delivery, and shipment was made only after coordination with QUAL Laboratory thru Industrial Operations, Mr. Duerr.

c. The reason for returning this Unit to ME was for incorporation of a design change which became known only after delivery.

d. I want to assure you that we try always to make our decisions in the best interest of the whole project and that we do not try to make "phony" deliveries. After delivery of the S-IC-501, for example, we have received 3626 Engineering Change Orders effective for this stage, -501.

2. Bonded Structures Facility in ME Laboratory: The conversion of our former Sheet Metal Shop, 4707, into a bonded structures facility will soon be completed. This had been planned and funded mainly for the Centaur Shroud Project and represents an investment of more than two million dollars. It consists of an Autoclave of 17 ft. diameter, 35 ft. long, 110 psi pressure and up to 600°F; three clean rooms for lay-up work, a spray booth, a drying oven, and various other tools and equipment needed for bonding of structural components of Centaur Shell size. A survey of bonding facilities in this Country indicates that there are only 4 or 5 such facilities of comparable size in existence (Tulsa, Rohr, Boeing, and Lockheed/Marietta), all of which have scheduled work loads for aircraft and Apollo (LEM Adaptor) Programs. After cancellation of the S-IB/Centaur Program, we plan to utilize this valuable facility for development of bonding techniques and non-destructive inspection methods. This facility represents a valuable asset in our facilities and is available soon for future projects.

3. Ad Hoc Meeting on Bonding of Secondary Structures: Since bonding problems are experienced at our stage Prime Contractors and in the Apollo Program as well, this Ad Hoc meeting was held last week at MSFC for discussions and exchange of experience of design, adhesive materials, and techniques. The following participated in the meeting: P&VE, QUAL, ME, Boeing, S&ID/S-II, S&ID/Apollo, Grumman, DAC, and Chrysler. This exchange of technical knowledge and sharing of experience is of great importance for prevention of failures and building quality into the hardware.

*19
notes*

JS 11/15

B 11/21

1. S-IC-501: Initiation of mechanical and pressure functional testing was delayed four days, until November 5, due to incomplete status of several items. Also, on that date power was applied to the stage for resumption of checkout. The status of the stage now is such that beneficial testing can continue in practically every system. ✓

2. IU-500-FS: IU-500-FS was transferred to R-QUAL on October 25, 1965. After analysis of the assembly status revealed that no systems were complete, representatives of QUAL, ME, and the Project Office, decided to return the unit to ME for incorporation of outstanding EO's and addition of available items that were missing. The IU is scheduled to return to QUAL on November 29, 1965.

3. IU-202: In their November 9, Quarterly Review, IBM reported a schedule for completion of checkout for IU-202 of February 9, 1966, which is the date the Center was requesting. IBM will assume complete checkout responsibility for IU-202 and all subsequent IU's. This Laboratory will provide assistance on IU-202 checkout where necessary. ✓

4. RCA 110A COMPUTER SPARES: The availability of RCA 110A Computer spares has been an extended problem. Action has been taken to correct this problem and a logistics contract with RCA is in NASA Headquarters for final approval. The contract, which should be completed this week, will provide depots for spares and repair work in Huntsville, Michoud, and KSC. The target date for establishing the Huntsville facility is May 1, 1966. Interim action to provide spares on an expedited basis is being taken. ✓

5. MSFC SOUTHEASTERN REGIONAL OFFICE: Through agreement with KSC, quality assurance monitoring of MSFC contracts in the Florida area will be accomplished by KSC. As a result we closed our Southeastern Regional Office this month. The Senior Laboratory Representative who headed this Office has transferred to KSC. ✓

Letter
Issuers
out
D.G.

Somebody
apparently
impress
someone
but it
backfired!

Let's stop
phony deliveries
just to make
a schedule
milestone!

UPOT

(H) 1-19-66 JH

NOTES 12/6/65 JAMES

SA-201: The LOX and RP-1 loading tests were run last week. The RP-1 test is scheduled to be rerun because a fuel leak was detected in the vent valve during the test. The discrepant valve will be replaced.

During the LOX loading test a hold was called due to an inadvertent water spray on the launch pad. The problem resulted from a premature liftoff signal attributed to the countdown clock. No water damage was assessed.

The overall launch vehicle checkout is well within the current launch schedule.

SA-201 PREFLIGHT REVIEW: We held a dry run for the SA-201 Preflight Review last week. A number of troublesome problems on the IU-201 hardware were discussed. These will be covered in some detail at the Preflight Review next week.

There were two major problems which require additional attention to establish an R&DO position. These are the S-IVB flutter problem and the flight worthiness of the IU ECS manifold. Mr. Weidner has agreed to take action on these two prior to our review.

Copies of the vehicle report will be provided to members of the Review and Assessment Board prior to the review on December 14. We have rescheduled the overall assessment and the Board deliberations for December 16.

S-IVB: Our pre-negotiations position of the DAC incentive contract covering cost fee and incentive criteria provisions was presented to and approved by Dr. Mueller on December 1. Negotiations with DAC are rescheduled for completion this week.

1. SMK-23 VISUAL LANDING SIMULATOR:

The SMK-23 Visual Landing Simulator has been installed at R-COMP-RS and is now operable. Interfacing will be completed shortly with computers and a general purpose cockpit. This combination of equipment is scheduled for use in man/machine studies of AAP lunar surface vehicles and concepts of reusable orbital transports. Astrionics and Propulsion & Vehicle Engineering Laboratories are also participating in this work. Operating features of the SMK-23 include (1) six-degree-of-freedom of a terrain view, (2) a high intensity color television projection system, and (3) a 3,000 to 1 terrain model.

2. PREPARATION FOR THE THIRD GENERATION COMPUTER:

In order to be better prepared for the Third Generation computer, the Digital Projects Branch has taken the following recent actions:

a. Two separate RFQ's have been prepared and forwarded for consideration. The first one is for replacement of a computer located in the Manufacturing Engineering Laboratory and the second is for replacement of four IBM 1620 computer systems.

b. The Computation Laboratory recommends, wherever feasible, FORTRAN IV as the only computer language. Differences of the FORTRAN IV implementation on different machines (with special emphasis given to CDC 3200, SDS 9300, and IBM 7094) are being investigated.

3. ADP SYSTEM FOR PRE-POST INVENTORY PROCESSING:

The ADP system for pre-post inventory processing, in which the bulk of supply activity is controlled directly by the computer has completed a thirty-day acceptance test by the Technical Materials Branch, TSO, and was placed in production status on December 6. This system was developed over a three year period at a cost of approximately \$126,500. The cost includes seven man-years of effort and 100 hours of computer time for assembly and testing, plus other miscellaneous costs. The monthly computer costs, including the 24 remote input/output devices, will be approximately \$21,675.

The following is from the "Summary" of the system, as presented by Technical Materials Branch and the Computation Laboratory to Mr. Gorman and representatives of other offices on December 2, 1965.

The pre-post system provides many advantages over the present system of inventory control, some of which are listed below:

a. Immediate information on the up-to-date status of any given account record and statistical information not possible under the present system can now be provided.

b. Faster service for customers will be possible.

c. Reduction in inventory, excess, and procurement can be realized through the ability of the pre-post system to provide daily reorder information.

d. Processing of peak loads resulting from present "batch processing" will be cut to a minimum by a continuous flow of work.

e. Several functions involving the time of a considerable number of personnel can be eliminated.

\$ + 1.0 million
for ADX

9/8/12/7

B 12/7

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B 12/7 2

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9/12/7

B12/7

C-1 ENGINE

Headquarters approval of the contract was received November 13, 1965. We plan to delegate secondary contract administration to DOD (DCASO). ✓

H-1 ENGINE

After the gearbox fire on engine H-4072 on November 16, 1965, a new turbopump was installed and during the last acceptance test on December 1, a fire occurred again in the new gearbox and the engine was damaged beyond repair. Post test examination indicates the probability of a LOX seal failure. MSFC and Rocketdyne teams are conducting an investigation to determine the cause of and solution to this problem. A joint MSFC/Rocketdyne meeting is scheduled at MSFC on December 7, to review the situation and plan further actions. ✓

F-1 ENGINE

Status Contract Conversion:

Negotiation with Rocketdyne of an acceptable target cost and fee structure in the incentive conversion of the F-1 deliverable hardware Contract NAS 8-5604 is proving quite difficult. ✓

J-2 ENGINE

The QUAL I Demonstration program was initiated December 2, 1965, with a successful 470 second test. ✓

Personnel from P&VE were at Rocketdyne last week to review all data on the recent LH₂ turbine wheel failure. They reported that Rocketdyne had accomplished a thorough evaluation of the problem and concurred with Rocketdyne redesign. ✓

A meeting was held at AEDC on November 26 among MSC, the Air Force and ARO to discuss the new requirement for Agena engine tests. Ed Williams, of the J-2 Engine Office, attended the meeting because of possible interference between this new requirement and the planned J-2 test at AEDC. The Agena engine will be tested in cell J-2A, currently occupied with the LEM descent engine. The only apparent possibility of interference with the J-2 engine tests, to be done in cell J-4, is the loss of three or four design engineers to the Agena effort. LEM descent engine testing at AEDC will be suspended until completion of the Agena engine tests. ✓

RL10 ENGINE

Testing on the E-5 dual-position test stand at Pratt & Whitney has indicated that the higher than normal thrust overshoot on the Centaur AC-6 engines may have been caused by LOX vaporization in the LOX tank under the reduced g loading at booster engine shutdown. Methods of increasing tank pressure or ullage thrust during the coast interval are being investigated. ✓

Thrust chamber vibration tests to substantiate weight reduction features will begin next week, subsequent to a detailed review of these features. ✓

An RL10A-3-3 prototype engine installed as the #2 engine on the Battleship Propulsion Test Vehicle at Sycamore Canyon experienced a tube burn through late Friday. Since the engine is not field repairable, it will be replaced by an identical engine originally allocated to Atlas/Centaur vehicle AC-9. The AC-9 engine will be replaced by an available spare. The cause of the failure is not known at this time. ✓

B 12/7

Q247

1. TURBOPUMP GEARCASE EXPLOSION OCCURS DURING ENGINE TESTING: During acceptance testing of H-1 Engine H4072 on 12-2-65 the test was terminated immediately after engine start due to a LOX seal drain temperature exceeding the redline value of -275°F . There was also a gearcase pressure spike of 18 psig (4 psig normal). Investigation of the hardware revealed an explosion had occurred in the gearcase, resulting in extensive damage. A failure of the LOX shaft seal is indicated by both the measurements mentioned above and the gearcase explosion.

This is the second occurrence of gearcase damage within two weeks. The first incident on 11-16-65 was definitely attributable to LOX seal failure. There have been three other LOX seal failures since June 1965. Rocketdyne is investigating this problem and will present findings and recommendations at MSFC on Tuesday, 12-7-65. This problem has serious implications for all delivered H-1 Engines and especially SA-201.

✓

12/7 95A
1. OPEN HOUSE AT MICHLOUD - December 4, 1965

Michoud Assembly Facility will hold its first joint NASA - contractor open house from 9 a. m. until 3 p. m. on Saturday, December 4, 1965. All contractors, i. e., Boeing, Chrysler, Mason-Rust, and Telecomputing Services, Inc. will participate. ✓

2. VISIT TO MICHLOUD OF CORPS OF ENGINEERS REPRESENTATIVES

Lt. Col. E. F. Smith and C. B. Barnes, Associate Deputy for NASA Support, both of the Office of Chief of Engineers, Washington, D. C., and Walter S. Mask and James R. Hanchey of the U. S. Army Engineer District, New Orleans, met with Michoud management on December 2, 1965, to discuss additional hurricane protection being planned and recommended for the Michoud area. A comprehensive report is to be submitted by the end of December. Upon receipt these recommendations will be discussed with Marshall management. ✓

SND 12/17

1. Experiment Coordination

Upon request of Dr. Reiffel a list of experiments has been furnished to the Apollo Program Office which can be supported in a similar manner as MSFC #1 (Dielectric Materials Evaluation) by the Standard Payload Module attached to the Instrument Unit. Presently, the list shows fifteen (15) such experiments in various states of preparation. ✓

Since MSFC believes that the experiment MSFC #1 "Dielectric Materials Evaluation" can be conducted on Vehicle AS 205 or AS 206, Dr. Turnock (Apollo Program Office) and Dr. Lundholm (Apollo Applications Program Office) have been requested to reconsider the assignment to AAP Flight AS 211. The information to be obtained is needed as early as possible. ✓

It is anticipated that \$2.0 M will be authorized around 1-1-66 to fund MSFEB approved experiments. Based on this information R-P&VE and R-ASTR have been requested to initiate procurement action. ✓

2. Data Management

"Operation Papermill" is underway and will be covered under the Incentive Awards Program. A coordinating committee has been formed, the operational details have been established and several announcements have been included in the Marshall Star. ✓

NOTES 12/6/65 FELLOWS

B12/7

NS 12/7

1. Transfer of Civil Service Spaces: Planning has been completed and the laboratories advised of the current increment of civil service space reductions to meet our commitments to IO and MSC. On December 2, 38 spaces were transferred to IO, completing the R&D Operations obligation to transfer 250 spaces to that Operations. At the same time, 67 spaces were withdrawn from R&D Operations for transfer to MSC. That action represents the first of six increments which, in total, will reduce R&D Operations by 157 civil service spaces -- our share of the 200 MSFC personnel spaces to be transferred to MSC by June 1966. ✓
2. S-IC-1 Checkout: Checkout of the S-IC-1 stage is back on schedule. ✓
The eleven lost days have been made up. Problems which occur on a day-to-day basis are being resolved by the Quality/ME/Boeing team. ✓
3. Cost Reduction: Center management assigned R&D Operations a \$9M cost reduction goal for this fiscal year. Through November, cost reductions of \$3.1M have been realized. The laboratories were recently furnished a summary of R&DO cost reduction progress to date and urged to continue their interest and efforts in this important program. Also in furtherance of the cost reduction effort, a meeting was held last week with representatives from Astrionics, Sperry-Rand, and this office. The meeting established a mutual understanding of the importance of two-way communication in cost reduction reporting -- the contractor-reported cost reductions which affect civil service operations and, similarly, civil service cost reductions which affect the contractor's operations. ✓
4. R-OM Personnel Assignments: Mr. Gene Daniel, formerly of the Financial Management Office, has joined this office as Chief of our Budget Group; and Mr. Joe Thompson, formerly of the Purchasing Office, has become our Chief of the Contracts Office. ✓

NOTES 12-6-65 GRAU

12/7 JFZ

B 12/7

1. S-IC-1 CHECKOUT: Checkout of the S-IC-1 stage is presently on schedule. Missing parts and discrepancies continue as problems which require vigorous expediting attention in order to maintain checkout progress. ✓
2. S-IV PROGRAM: The S-IVB 202 stage completed a 463 second firing December 1, 1965. There were no apparent problems and the records look good. Post-static checkout is now in progress. ✓
3. S-II QUALITY PROGRAM PLAN: Review of the S-II Quality Program Plan has been completed and agreement reached with S&ID on all comments. S&ID will incorporate the comments and publish the document. A contract change is being accomplished to make the Quality Program Plan contractual. When the contract change is completed, instructions will be issued to the inspection agency (NASA-O) to use the plan instead of NPC 200-2. We have established a regularly scheduled weekly meeting at S&ID with their Quality Control manager in order to expedite current and future quality control problems. ✓
4. IU-500FS: The S-IU-500FS checkout complex in 4708 was accepted November 25, 1965. The IU will be transferred to checkout again on December 6, 1965. ✓

B 12/7

1. ATTITUDE CONSTRAINT ON 501 ORBITAL FLIGHT: Astrionics Laboratory has recently been made aware of an attitude constraint by P&VE on the 501 orbital flight phase due to J-2 engine restart bottle heating considerations. The bottle is charged with restart gas during the initial flight phase of the S-IVB stage. The charge pressure is not sufficient, however, to initiate J-2 restart. It is therefore necessary to position the vehicle with Fin I down and the vehicle roll axis perpendicular to local vertical for 80% of the first orbit in order that the gas in the start bottle can absorb enough heat energy to be capable of J-2 restart. Attitude requirements in orbit from MSC state that the S-IVB stage should be aligned with the vehicle roll axis perpendicular to local vertical but rolled 90° (fin IV down) due to cold soak requirement on the spacecraft heat shield. The two requirements are in direct conflict. A second consideration is that, as presently designed, the J-2 start bottle heat input requirement prevents J-2 restart during the first orbit (90 minutes). This is consistent with P&VE Memo PPF-64-M-220, "Definition of Maximum Time Requirement between J-2 Engine Starts in Flight," September 23, 1964. This requirement is not consistent with the desires of ASTR and should be rescinded if possible. ASTR desires to leave orbit as soon as possible because system reliability decreases as a function of time, and navigation errors increase significantly in the second and third orbits. In order to overcome the imposition of attitude and minimum orbital stay time constraints on future missions, it is highly desirable to correct the restart pressurization problem by some means other than solar heating.

2. MULTIMODE SPACE MANEUVERING UNIT: With our encouragement Mr. Fornoff, S&ID, has worked out a proposal of a Space Maneuvering Unit, which can be used for various submissions, either for manual control or for remote control. Missions can be accomplished in connection with the orbital workshop; recovery of satellites, including de-spinning; and stabilizing extra vehicle telescopes. The Advanced Systems Office favors the proposal, and I would like to suggest giving you a presentation on December 22. Would you like such a presentation?

W.H.
I understand
that MSC
needs a mini-
mission of one
orbit for
CSM checkout
in parking
orbit, - so
you can't
have your
"on, as soon as possible" anyhow!

B

W.H.

Yes, I'm greatly
interested. B
Please lay it
on jointly w/ Frank Williams

Ludie Richard

Suggest you get into the act.

B 12/7

B 12/8

→ S-IC-T: Test S-IC-14, approximately 145 seconds duration, is scheduled for December 9, 1965. According to present plans this will be the final test on stage S-IC-T prior to receiving stage S-IC-1. The time between this firing and S-IC-1 will be spent in de-bugging computer programs and getting the complex ready. S-IC-T will be removed from the test stand on January 17, 1966, and stored. ✓

F-1 ENGINE: Test TWF-071 was conducted with F-1 Engine S/N F-1002-3 at the Static Test Tower West on November 30, 1965, for a planned mainstage duration of 56.07 seconds. Primary test objectives were to evaluate engine performance at minimum lox NPSH of 69 feet and to determine the effects of eliminating the low lox dome purge during thrust chamber prefill. ✓

S-IVB (SACRAMENTO): Flight vehicle 202 was successfully acceptance fired for a duration of 462.7 seconds at Sacramento Test Center on December 1, 1965. cursory data review indicates satisfactory completion of all objectives. ✓

S-II BATTLESHIP (SANTA SUSANA): The first scheduled firing of flight-type engines has been delayed until approximately December 10, 1965, due to suction line welding problems and cracks in the LH₂ tank chill channels. ✓

S-II-T (MTF): The facility lox system is scheduled for LN₂ shocking the week of December 6, 1965. Holes have been cut into the forward bulkhead seal to retrieve 544 foreign objects located there. Other stage facility checkout continues. ✓

GSE RANDOM MOTION SIMULATORS: The acceptance test of the Service Module position was successfully completed November 30, 1965. Only one position remains to be accepted, the S-II Forward position, and it is now in check-out and scheduled for completion by December 15, 1965. ✓

NUCLEAR STAGE/FACILITY: SNPO has completed negotiations with Kaiser Engineers, Oakland, California, for a five month study effort on Engine/Stage test facilities at the NRDS. The kick-off meeting with Kaiser was held during the past week, with limited MSFC participation. ✓

S-IC-T (Reference your comment on November 15, 1965 Notes, copy attached) The gold plated injector had not been installed at this time. (The plated injector was installed after removal of the cracked injector.) ✓

Shop
If possible, I'd like Mr. George Brunker of Martin
witness this test. He'll be in HSV for a visit.
Bowie has details. B

B 12/8

1. SMK-23 VISUAL LANDING SIMULATOR:

The SMK-23 Visual Landing Simulator has been installed at R-COMP-RS and is now operable. Interfacing will be completed shortly with computers and a general purpose cockpit. This combination of equipment is scheduled for use in man/machine studies of AAP lunar surface vehicles and concepts of reusable orbital transports. Astrionics and Propulsion & Vehicle Engineering Laboratories are also participating in this work. Operating features of the SMK-23 include (1) six-degree-of-freedom of a terrain view, (2) a high intensity color television projection system, and (3) a 3,000 to 1 terrain model. ✓

2. PREPARATION FOR THE THIRD GENERATION COMPUTER:

In order to be better prepared for the Third Generation computer, the Digital Projects Branch has taken the following recent actions:

a. Two separate RFQ's have been prepared and forwarded for consideration. The first one is for replacement of a computer located in the Manufacturing Engineering Laboratory and the second is for replacement of four IBM 1620 computer systems.

b. The Computation Laboratory recommends, wherever feasible, FORTRAN IV as the only computer language. Differences of the FORTRAN IV implementation on different machines (with special emphasis given to CDC 3200, SDS 9300, and IBM 7094) are being investigated. ✓

3. ADP SYSTEM FOR PRE-POST INVENTORY PROCESSING:

The ADP system for pre-post inventory processing, in which the bulk of supply activity is controlled directly by the computer has completed a thirty-day acceptance test by the Technical Materials Branch, TSO, and was placed in production status on December 6. This system was developed over a three year period at a cost of approximately \$126,500. The cost includes seven man-years of effort and 100 hours of computer time for assembly and testing, plus other miscellaneous costs. The monthly computer costs, including the 24 remote input/output devices, will be approximately \$21,675.

The following is from the "Summary" of the system, as presented by Technical Materials Branch and the Computation Laboratory to Mr. Gorman and representatives of other offices on December 2, 1965.

The pre-post system provides many advantages over the present system of inventory control, some of which are listed below:

a. Immediate information on the up-to-date status of any given account record and statistical information not possible under the present system can now be provided.

b. Faster service for customers will be possible.

c. Reduction in inventory, excess, and procurement can be realized through the ability of the pre-post system to provide daily reorder information.

d. Processing of peak loads resulting from present "batch processing" will be cut to a minimum by a continuous flow of work.

e. Several functions involving the time of a considerable number of personnel can be eliminated. ✓

H.H.
Please
arrange
(with
Bonnie)
a visit
for me
B

B 12/8

NOTES 12/6/65 JAMES

9/8/12/7

SA-201: The LOX and RP-1 loading tests were run last week. The RP-1 test is scheduled to be rerun because a fuel leak was detected in the vent valve during the test. The discrepant valve will be replaced. ✓

During the LOX loading test a hold was called due to an inadvertent water spray on the launch pad. The problem resulted from a premature liftoff signal attributed to the countdown clock. No water damage was assessed. ✓

The overall launch vehicle checkout is well within the current launch schedule. ✓

SA-201 PREFLIGHT REVIEW: We held a dry run for the SA-201 Preflight Review last week. A number of troublesome problems on the IU-201 hardware were discussed. These will be covered in some detail at the Preflight Review next week. ✓

There were two major problems which require additional attention to establish an R&DO position. These are the S-IVB flutter problem and the flight worthiness of the IU ECS manifold. Mr. Weidner has agreed to take action on these two prior to our review. ✓

Copies of the vehicle report will be provided to members of the Review and Assessment Board prior to the review on December 14. We have rescheduled the overall assessment and the Board deliberations for December 16. ✓

S-IVB: Our pre-negotiations position of the DAC incentive contract covering cost fee and incentive criteria provisions was presented to and approved by Dr. Mueller on December 1. Negotiations with DAC are rescheduled for completion this week. ✓

LBJ

How about the H-1 lox seal failures? See Belew
Notes 12-6-65. B

B 12/8

9/8 12/7

1. IU-500-S: Reference NOTES of Mr. Grau 11-15-65 (copy attached). For clarification, the following information is offered:

a. In the early development phase of stages, we have always to telescope our activities of design, fabrication, and testing. There will never be a delivery of a first vehicle without shortages or outstanding design changes. ✓

b. The shortages of this Unit were well known and discussed prior to delivery, and shipment was made only after coordination with QUAL Laboratory thru Industrial Operations, Mr. Duerr. ✓

c. The reason for returning this Unit to ME was for incorporation of a design change which became known only after delivery. ✓

d. I want to assure you that we try always to make our decisions in the best interest of the whole project and that we do not try to make "phony" deliveries. ✓ After delivery of the S-IC-501, for example, we have received 3626 Engineering Change Orders effective for this stage, -501. ✓

2. Bonded Structures Facility in ME Laboratory: The conversion of our former Sheet Metal Shop, 4707, into a bonded structures facility will soon be completed. This had been planned and funded mainly for the Centaur Shroud Project and represents an investment of more than two million dollars. It consists of an Autoclave of 17 ft. diameter, 35 ft. long, 110 psi pressure and up to 600°F; three clean rooms for lay-up work, a spray booth, a drying oven, and various other tools and equipment needed for bonding of structural components of Centaur Shell size. A survey of bonding facilities in this Country indicates that there are only 4 or 5 such facilities of comparable size in existence (Tulsa, Rohr, Boeing, and Lockheed/Marietta), all of which have scheduled work loads for aircraft and Apollo (LEM Adaptor) Programs. After cancellation of the S-IB/Centaur Program, we plan to utilize this valuable facility for development of bonding techniques and non-destructive inspection methods. This facility represents a valuable asset in our facilities and is available soon for future projects. ✓

3. Ad Hoc Meeting on Bonding of Secondary Structures: Since bonding problems are experienced at our stage Prime Contractors and in the Apollo Program as well, this Ad Hoc meeting was held last week at MSFC for discussions and exchange of experience of design, adhesive materials, and techniques. ✓ The following participated in the meeting: P&VE, QUAL, ME, Boeing, S&ID/S-II, S&ID/Apollo, Grumman, DAC, and Chrysler. ✓ This exchange of technical knowledge and sharing of experience is of great importance for prevention of failures and building quality into the hardware. ✓

B 12/8

9/18/12/17

NASA FY-67 BUDGET RECLAMA TO BOB - The NASA reclama to the BOB FY-67 budget mark was forwarded to BOB Dec. 3. Essentially, the NASA budget request of Oct. 1 was resubmitted without any change in total funding requested. The only two MSF accounts that were varied were Apollo (up +\$54M) and AAP (down - \$63M). ✓
 Per telecon, the following is the essence of the NASA reclama regarding AAP:
 "Further analysis of the Oct. 1 submission has been performed....In order to preserve programmatic options critical to this new effort, a \$201 million level is required...." The required funding will accomplish:

1. Maintain production and flight rate of 6 x 6 x 8. ✓
2. Provide extended mission capability by 1970. ✓
3. Provide for operational rather than scientific emphasis in the potential alternate missions stressing activities such as: (a) Orbital assembly of large structure, (b) Orbital resupply and propellant transfer, (c) Earth polar orbit, (d) Earth synchronous orbit. ✓
4. Maintain option for utilization of follow-on missions for sophisticated experimentation (scientific and technological) and operational capability such as 45 and 90 day E.O. flights, 28 day L.O. and 14 day L.S. missions. ✓

A \$201 million program will provide for an acceptable range of alternatives for the FY-68 program and related budget decisions. Because the range of options will remain open, the FY-68 program will be responsive to our national needs including the International situation (USSR activity) which may indicate the desirability of a high level flight activity in the Post-Apollo era. ✓

The \$112 million FY-67 level suggested by BOB does not maintain the option for an effective experiment and payload development program for either the alternate or follow-on missions. ✓

The entire \$63M reduction is in the Alternate Apollo Missions Experiments and Support category. ✓

SATURN IB - Col. Newman, the resident Air Force liaison officer to MSFC and the Army Missile Command, contacted us on Dec. 3 regarding Saturn IB R&D Vehicle Costs. The contact resulted from an Aerospace Corporation request to Col. Newman for data for use in their studies of future launch vehicles in the class between Saturn IB and Saturn V. We advised Col. Newman that Aerospace should contact the representative of Space Systems Division, USAF, who participated in the Joint NASA/DOD National Launch Vehicle Study of the fall of 1964. The cost of R&D. H.M.
 vehicles was provided to DOD in that study. ✓ *New cost figures, I hope!*

We consider this contact significant since Col. Newman indicated that the Aerospace Corporation studies are directed toward increasing available payload weight and eliminating the payload diameter constraint of Titan IIIC. Should the Air Force be able to "sell" a new vehicle program with capabilities between Saturn IB and Saturn V, the Saturn IB would be "bracketed" by Air Force vehicles and probably could not survive. ✓ We feel that this indicates a pressing need for serious consideration of an uprating of Saturn IB. ✓ We will strive to learn more about the Aerospace Corporation studies. ✓

We need a 260" solid

vs strap-on 120" study. →

4.M.
 let's have a meeting on this,
 incl. Lee Janice, Weidner, Cline,
 Williams, et al. B

NOTES 12/6/65 REINARTZ

B 12/8

No submission this week.

9/8/12/17

B 12/8

NOTES - 12/6/65 - RICHARD

QD 12/7

Ground Computer Program Problem at KSC: On Thursday, Dec. 2, 1965, a problem with the ground computer operating system programs occurred during checkout operations. This program error caused erroneous outputs to be issued to the vehicle electrical system. No known damage occurred as a result to these erroneous signals. ✓

The problem was identified and reproduced in the Saturn IB System Development Breadboard Facility. A correction was made, tested, and sent to KSC the night of Dec. 2, 1965. The problem was a result of an error made in a previous change to correct a different situation. This shows again that very close coordination is required in making changes and/or corrections to these programs. MSFC (R-ASTR) and KSC are working with IBM to continually improve this coordination and to improve the procedures. ✓✓

LR

↑ Please keep KSC constantly aware of this!! Z

NOTES 12/6/65 RUDOLPH

B 12/8

9/12/7

1. Saturn V Systems Engineering and Integration (SE&I) Contract - Schedule for conversion of Boeing's - SE&I Contract to incentive is:

- | | |
|--|---------------|
| ● Issue RFQ | 7 February 66 |
| ● Receive Firm Proposal | 22 March 66 |
| ● Present Pre-Negotiation Position to NASA Headquarters for approval | 29 April 66 |
| ● Start Negotiations | 9 May 66 |
| ● Complete Negotiations | 31 May 66 |
| ● Submit to NASA Headquarters for approval | 30 June 66 ✓ |

2. S-IC-T Stage Test Program - Our originally planned S-IC-T Stage captive firing test program, consisting of progressively longer manual firings to full duration, followed by three automatic captive firings, has been successfully completed. ✓ Requirements recently developed necessitate two additional tests be performed and the first is tentatively scheduled for Thursday, 9 December 65. ✓

3. S-II Stage Aft LOX Bulkhead - Contractual direction is being issued to NAA/S&ID requiring a "collar" doubler be added to the 111" aft LOX bulkhead weldment for all S-II flight stages. The No. 1 unmodified bulkhead will be installed in S-II-1 and retrofitted prior to stage shipment from Seal Beach. The No. 2 bulkhead will be modified with the "collar" doubler and used for ultimate tests (safety factor of 1.4). ✓

4. S-IVB Stage Incentive Contract Status - The MSFC pre-negotiation position covering cost, fee and incentive criteria provisions was presented to and approved by Dr. Mueller on 1 December 65. Final conversion negotiations are scheduled to be completed this month with the contract documents forwarded to Headquarters by 31 January 66. ✓

NOTES 12/6/65 SPEER

B 12/5

95812/7

1. MISSION SUPPORT TO HOUSTON CONTROL CENTER: I have received a copy of a letter from Kraft to Preston formally requesting KSC support to MCC-H in all flight operations problems which might arise with regard to the Spacecraft. Preston was requested (1) to provide detailed engineering knowledge, and (2) to perform ground tests on similar spacecraft equipment in the analysis of particular flight problems. This request is the exact complement to our planned S-IVB/IU support to Houston through LIEF in conjunction with KSC. ✓
2. MISSION RULE GUIDELINES: Upon request we assisted Rod Middleton, the 203 Mission Director, in formulating a first draft of subject guidelines. They will be forwarded to the Centers for comments. ✓
3. AAP NETWORK PLANNING: A representative of I-MO attended (11/30/65) a presentation by GSFC on the results of a study to define the various minimum augmentations necessary to provide network support for AAP missions. The study resulted in a preliminary plan for augmentation and operations of these networks. The importance of sufficient lead time for network implementation was stressed. It was assumed that early AAP missions through CY 1968 could be handled by the Apollo Network without significant augmentation. ✓

B 12/12

1. PEGASUS: The ^{AS 12/17}beacon transmitter on Pegasus II has resumed operation; it has been working properly for the past two weeks. Otherwise, there were no essential changes. ✓
2. AAP: Lunar Surface - As a follow-up to Mr. Gierow's presentation to Dr. Mueller, we have been asked to prepare a two weeks' lunar surface mission based on a 3 km radial range capability for the lunar surface vehicle. Only lunar day operation is to be considered. The scientific payload capability of the vehicle will be limited to 200 pounds mass (approximately 90 kg). The scientific payload will be completely self-contained with respect to power and data handling equipment. The vehicle provides nothing except a capability for carrying equipment - like a flat bed truck. We have a two weeks' deadline to complete a first cut of the scientific mission based on this philosophy. We will present the two weeks' study results to Ed Gray. Earth Orbit - Several members of ASO and RPL will visit Drs. Schwarzschild and Spitzer this week to discuss orbital astronomy systems, and man's role in an orbital observatory (combination of SIVB Workshop and OAO). ✓✓

RPL, in close cooperation with ASO, is working out plans for scientific packages to be carried on typical SIVB Workshop payloads. ✓

^{November}
In a Badgley Team Meeting at MSC on numbers 29 and 30, the subject of radiometers, brightness temperatures, and microwave emissivities in conjunction with earth surface and lunar surface measurements were discussed. RPL may offer an infrared experiment in this area. We are particularly interested in a correlation between microwave and IR temperature determination. Microwave measurements may be able to provide temperature readings at different depths of penetration, depending on the wavelength chosen for the experiment. ✓

3. SUPPORT TO MSC: Mr. T. Craig, Apollo Office, MSC, requested the support of RPL in a problem of Apollo temperature control which involves the thermal control coatings, S-13 and Z-93. On both coatings, RPL has done extensive laboratory and space studies. We are, of course, very glad to help MSC out. ✓

4. DEDICATION OF LANGLEY RADIATION CENTER: Dr. Russ Shelton will attend the dedication of the Virginia Associated Research Center at Langley Research Center as your representative on December 15. ✓

B 12/8

12/17

1. S-IVB Workshop. In view of the recent revisions in the Workshop plan, new guidelines for the longer range activity have been issued. Also, guidelines, tentative agenda, and rationale for the forthcoming meetings - internal MSFC meeting on December 16 and Management Council Meeting during the week of December 20 - have been issued. Although the time is too short to pull together a complete technical story on flying a Workshop on 209 and an early pressurized version, I feel that we can ascertain the Center's ability to meet these desired objectives and be in a position to present a "solid" proposal to MSF in two weeks. ✓

2. Titan III Workshop. During a Webb-inspired Martin-Denver facility/capability inspection last week, Mr. Charlie Wood, R-P&VE-P, reported that he and Bill Horton, R-ASTR, were shown an effort currently underway at Denver which I feel would be of interest to you. Martin has an Air Force \$1.5M effort (study/definition/mockup) going on that is aimed at flying an unpressurized Titan II lox tank on top of the T-III into earth orbit on an unmanned flight in mid CY 66. There will be about 15 experiments integrated into the tank and Martin has/will do the integration job. Some of the experiments are probably similar to the ones we are considering for early AAP flights. Two that Charlie recalls are (a) fluid behavior - boiling, heat transfer, etc., and (b) liquid transfer and mass determination, including flow measurements. We will follow up on this and get more details.

FW

Titan II doesn't use lox.

You are talking

- either about Titan I

- or about N2O4.

B

FW

MSFEB

must approve

such AF

experiments.

Suggest you bring

this to Jim

Elms' attention.

B

December 13, 1965

B 12/15

JTS 12/13

J-2 ENGINE Thursday night at cut-off of a 40 second mainstage test on R&D engine 019 in the altitude simulation test stand (VTS-3A), the gas generator valve failed to close, causing a LOX-rich cut-off and fire. Preliminary assessment indicates loss of the engine, with the possible exception of the injector, and minor facility damage. First look analysis indicates freezing of the filter in the gas generator valve control line prevented the gas generator valve from closing.

Design effort for the test cell modification at AEDC has progressed to approximately 50 percent complete and a formal Design Review was held December 7 and 8 at AEDC. Representatives of P&VE, TEST, Rocketdyne, Douglas, S-IVB Office and this office participated. The design concept and progress is satisfactory.

F-1 ENGINE An F-1 turbopump, intended for a flight engine, failed in green run Friday night. The cause of the failure is not known, but it apparently started in the turbine area. The LOX pump blew after the turbine failure. First estimate is that the test position, Bravo II-C, will be down about three weeks.

Retrofit of S-IC-2 engines with the FRT configuration high-strength braze injectors is nearly complete.

A formal settlement offer in the incentive conversion negotiation of the deliverable hardware contract has been made to Rocketdyne with a request to reconvene formal negotiations today. It becomes more obvious daily that successful conversion of NAS 8-5604, this year, is remote.

H-1 ENGINE A meeting was held with Rocketdyne at MSFC on December 7, to review the recent LOX carbon seal failures. An immediate plan of action was adopted which calls for installing dual LOX seal cavity drain lines on all engines on Vehicle SA-201 and subsequent. The seal mating ring gasket which was changed from "flat" to "cup" type in engines for Vehicle 206 and subsequent will be replaced with the "flat" design. The "cup" type gasket is a probable cause of failure due to its interference with the LOX carbon seal. Other action will include testing of a new carbon seal with an increased nose fillet radius, and continuing the development effort on the high nose load bellows seal.

RL10 ENGINE You asked Dan Driscoll to contact us on LOX boiling at booster shutdown (reported in my notes last week). We are coordinating the Centaur experience with P&VE, and the S-IVB and S-II project offices.

Potential performance improvements in the RL10 engine were reviewed last week with the Centaur project management at LeRC. The substantiation of these changes, which provide approximately 60 pounds of additional payload to the Centaur vehicle, will continue. A decision to incorporate the changes in production engines will be made in January.

GENERAL You asked about communication with LeRC in the engine area after cancellation of the M-1 project (my notes 10/25/65). The attached sheet describes our current effort and plans for this area.

* Attachment to Dr. von Braun's copy only

NOTES 12-13-65 CLINE

NEGATIVE REPORT

9/8 12/13

B 12/15

NOTES 12/13/65 CONSTAN

Qb 12/13

B 12/15

1. NASA HEADQUARTERS PERSONNEL VISIT
SLIDELL COMPUTATION OFFICE

Mr. Samuel Fordyce of NASA Headquarters Saturn/Apollo Applications Office visited the Computation Office on December 10, 1965. Mr. Fordyce was given a briefing of the capabilities and mode of operation of this office with emphasis being placed in the data reduction and data acquisition areas. It is our understanding that headquarters' interest is related to the Advanced Apollo Program. Mr. Fordyce was accompanied by several members of his office and representatives of the Marshall Computation Laboratory. ✓

2. COMPUTER OPERATIONS SERVICES

Negotiations are completed with the two firms selected for competitive negotiations for the computer operations services. Presentation will be made by the Source Evaluation Board to MSFC on Tuesday, December 14, 1965, and to NASA Headquarters on Wednesday and Thursday, December 15 and 16, 1965. ✓

3. CONTRACT NAS8-4016, CHRYSLER CORPORATION SPACE DIVISION

Currently CCSD's revised incentive proposal is being evaluated by Technical, Pricing and Contracts personnel. ✓

4. CONTRACT NAS8-5608, THE BOEING COMPANY

Supplemental Agreement MICH-110 which covers the conversion of Contract NAS8-5608 from a CPFF basis to CPIF basis has been hand-carried to MSFC for review prior to being forwarded to Headquarters for approval. ✓

5. S-IC

Vertical Assembly on 503 structure has been completed this week and it has been transported to horizontal assembly position. ✓

NOTES 12-13-65 DANNENBERG

B 12/15

Negative report. ✓

9/8 12/13

9/8 12/13

B 12/15

1. SATURN IB PROJECT SUPPORT AGREEMENTS (PSA): This office has received a draft of the Saturn IB PSA from Industrial Operations. Advance copies of that entire document have been provided to the laboratories. At present, the laboratories and this office are reviewing the PSA in preparation for discussions with IO; following these discussions, the PSA will be completed in final form. The Saturn IB PSA will constitute a major step in the formal definition of R&D Operations support to IO and clearly establish what that support is, how much it will cost, and who will do it. ✓

11
11
2. SPACE VEHICLE LABORATORY: Information informally received from Headquarters indicates that the R-RP Space Vehicle Research Laboratory was not included in the reclama of deleted FY-67 CofF projects to BOB. Deletion of the project leaves only one R&D Operations project in the FY-67 CofF budget; the Astrionics Addition to the Hazardous Operations Facility, with an estimated cost of \$581,000. ✓ *Sho look it out? B*

3. R&DO REPAIR AND ALTERATIONS (R&A) PROGRAM: The R&D Operations R&A program has steadily increased in importance relative to the CofF program. In recent years, the R&A work amounted to about one-tenth of the CofF program. This year, however, R&A -- at about \$3M -- is about 50% greater than CofF. Indications are that next year, we will again have about \$3M of essential R&A projects in R&D Operations, with the expected maximum of CofF being \$.5M, as mentioned in paragraph 2, above. ✓

4. BOEING SYSTEMS ENGINEERING CONTRACT CONVERSION TO CPIF: A meeting was held December 8 between Boeing and MSFC representatives to complete the schedule for CPIF conversion of the Boeing System Engineering and Integration Support and Launch Vehicle GSE contract. Paragraphs within that contract will be revised by MSFC/Boeing teams. Fully coordinated technical scopes of work will be available for an RFP by February 1966. ✓

CONFIDENTIAL

NOTES 12/13/65 GEISSLER

B 12/15

1. (c) IB Performance: Current Saturn IB payload capabilities, and the change in payload capability from the November figures, are as follows: AS-203: 20,810# LH₂ (+14); AS-204: 36,455# (+51); AS-205: 38,243# (+64); AS-206: 38,960# (+46); and AS-207: 39,455# (+46). ✓
2. FPS-16 Jimsphere: Our FPS-16 Jimsphere wind measuring system and prelaunch vehicle simulation program were discussed on December 3 at a meeting requested by Lewis Research Center. Attendees included personnel from Lewis' Agena and Centaur project offices and representatives from Lockheed and General Dynamics. Purpose of the meeting was to provide Lewis with technical information which will help them to incorporate our FPS-16 Jimsphere detailed wind data in their prelaunch simulation and other programs. Lewis personnel expressed sincere appreciation for our help. ✓
3. Mission Constraints: As part of our Flight Mechanics Panel Documentation Plan, the presently known mission constraints and trajectory guidelines on vehicles 204 205, 206, 207, 501 and 502 have been compiled and disseminated for review at MSFC. Resultant comments are expected soon, with a meeting tentatively planned for December 14, 15 with MSC, to integrate the L/V and S/C constraints into joint MSFC-MSC documents. ✓
4. Incentive Contracts: The S-IVB Flight Performance Plan has been coordinated with the involved laboratories, and is ready for final sign-off and transmittal to R-DIR. There, it will be joined with the R-QUAL plan for stage and subsystem performance during schedule milestones, and sent to I.O. for inclusion in the S-IVB Incentive contract for IB and V. The S-IVB stage office stated that negotiations with DAC on the incentive contract may begin within a week. Efforts on incentive plans for S-IB, S-IC and S-II will continue when S-IVB plan is firm. ✓
5. AAP-Atmospheric Sciences and Communications Programs: Mr. Jaffe and Dr. Tepper, Program Managers within OSSA for the communications and meteorology areas, respectively, contacted our laboratory to further explore MSFC's interests in lead Center activities. They are interested in a January briefing and discussion with you and other Center management. However, prior to this they wanted to discuss MSFC's interests and capabilities with MSFC representatives. They are aware of Dr. Badgley's discussions with us. Dr. McCall and Dr. Haeusserman have indicated interest; therefore, Mr. William Vaughan of my laboratory and Mr. William Horton, Astrionics Laboratory, will visit OSSA on Wednesday, December 15, for preliminary discussions. It is anticipated that subsequent follow-up by MSFC will be through Dr. McCall for a January meeting. This should provide MSFC with further depth in the OSSA plans and a better position on AAP opportunities as a lead Center for further experiments and integration activities. We shall check with Bonnie Holmes to determine your availability. ✓

Jim Shepherd

Interesting, in view of what
Kuehn told us today!
Please arrange. B 12/15

CONFIDENTIAL

B 12/15

RB 12/13

1. APOLLO PARTS INFORMATION CENTER (APIC): The Parts Reliability Information Center (PRINCE) effort which this Laboratory assumed in May, 1965, and which has since been redesignated as the APIC effort, has been in full operation supporting Apollo program participants at MSC, KSC and MSFC since August, 1965. The number of items identified by APIC, growing at a rate of 3000 to 5000 each week, has more than doubled the capability of PRINCE to date. The APIC/PRINCE capability, its value to the Apollo program, and its usefulness to organizations and individuals is being explained to managers throughout the Apollo program. As of this date, 28 presentations have been given at MSFC, KSC, MTF, Michoud and WOO. I-V is implementing a program plan, and R-ASTR and R-P&VE are establishing in-house policies for the execution of General Phillips' instructions. KSC participation is moderate and MSC is using APIC but has not yet submitted any inputs. Full benefit of the information center will come to post Apollo and Apollo Application Programs, which can apply SATURN and GEMINI test data and experience garnered under the present Apollo program. ✓
2. S-IC-1 CHECKOUT: S-IC-1 stage checkout continues on schedule, however there still remains considerable missing hardware. Several delivery dates from Boeing have slipped beyond January 1, 1966, and we are evaluating this situation to determine if these delays will impact delivery of the stage to R-TLST on January 17, 1966. ✓
3. S-IVB QUALIFICATION TESTING: Qualification testing mandatory for the launch of S-IVB-201 is complete except for five (5) items which are expected to be completed during December. Mandatory testing deletes (deferred until 202) several less critical environments on each of approximately 80 items. Also deleted or deferred are tests on 28 items which are considered non-mandatory for S-IVB-201. The remaining required testing is considered by R&D laboratories to be the very minimum for an approved S-IVB launch. ✓

B 12/15

1. PRECISION GYRO BEARING PROBLEM: (*Reference Item 1 notes of 11/29, copy attached). The gyros that failed utilized Barden bearings which were manufactured during the period from 3/65 to 9/65. Therefore, gyros assembled using this lot of bearings have been replaced with gyros having New Departure manufactured bearings. No failures have been experienced with New Departure bearings. Platforms are drift tested after a gyro has been replaced. No retrofit of bearings will be attempted. All bearings that are in inventory have been taken back to Barden and/or New Departure and tested. The inspection and testing procedures for disassembly of bearings at Bendix has been initiated; certain critical measurements are already being accomplished. Full implementation of the program by 8/10/66 is planned. ✓
2. EXPERIMENT MSF-1: Lunar Mapping Photography was assigned to MSC, not MSFC, and is a going project at MSC. I suspect that you confused it with Dr. Badgley's OSSA Remote Sensor Program, to which it is little related. Your notes of 10/7 on the MSF Experiments Board minutes touched off a concern within R&DO. I suggest that MSFC do no further work on MSF-1. ✓
3. STATUS OF 500FS TEST PROGRAM: IU was delivered to QUAL 12/6 for checkout and barring unforeseen difficulties 2/14/66 completion date will be met. ✓
4. STATUS OF 500ST (SATURN V BREADBOARD): Arrangements have been made to turn over the 500ST to the Breadboard Facility on 12/13. Buildup of the Breadboard Facility continues, and extensive updating of the 500ST must be accomplished. ✓

B 12/15

S-IC-T

Test S-IC-14 was successfully conducted at 4:09 p.m. on December 9, 1965. Engine cutoff, 1-4 sequence, was given by the console operator as planned at 146 seconds of mainstage for the inboard engine. The outboard engines were cutoff 3.95 seconds later as programed by the 1-4 cutoff timer. Most of the test objectives were achieved, however, two major test objectives were missed because of a procedural goof making it necessary to have another firing for these objectives. The next test scheduled for this week will be 40 seconds duration. Propellants will be tanked to the Stage 504 levels for checking the onboard pressurization systems in simulation of flight condition. ✓

S-IVB (MSFC)

Test S-IVB-010 was conducted on December 8, 1965, for a duration of 388 seconds. The test was cutoff prematurely when the lox pump inlet temperature transducer malfunctioned, however, all objectives were met except going down to 2% level on PU probes. ✓

S-IVB (SACTO)

Stage 202 - Data from the December 1, 1965, firing has been evaluated and the stage "bought-off" by NASA. The PU -caused oscillation, was 5K peak-to-peak levels during this test. (Stage 201 had 12K peak-to-peak levels.) ✓

Stage 203 - Pre-static checkout is in progress. The firing schedule has not officially slipped, but is indicated as the first week of February 1966. ✓

S-II BATTLESHIP (SANTA SUSANA)

The first Battleship firing with flight-type engines has slipped to approximately December 15-17, 1965, due to LH₂ tank leaks, instrumentation shortages, sequence problems, J-2 engine purge heater delay, etc. The duration for the first firing is planned for 50 seconds. ✓

S-II (MTF)

Insulation repair is in progress with 21 material repair directives (MRD's) submitted for MSFC approval. The forward skirt removal plan is being formulated to retrieve the foreign objects in the seal area. Facility buildup and checkout continue. ✓

GSE RANDOM MOTION SIMULATORS

The acceptance test of the S-II Forward Position was successfully completed December 8, 1965. This completes the AMF hardware contract. ✓

NOTES 12-13-65 HOELZER

12/13

B 12/15

1. VISIT BY AD HOC COMMITTEE FOR DATA PROCESSING (NASA HEADQUARTERS): Computation Laboratory was visited on December 9, 1965, by members of an ad hoc committee from NASA Headquarters, "Accessing NASA Data Reduction Facilities of the AAP." Visiting were Mr. S. W. Fordyce (MLO), Mr. J. L. East (REI), and Dr. S. E. Ross (MTE). They were given a formal presentation of Data Reduction and Flight Operations capabilities (I-MOO). In addition, they were given brief talks on future plans and views on the overall AAP data management problems. They asked many probing question, left with a good understanding of the Laboratory and apparently were well satisfied with their findings. ✓

2. THIRD GENERATION COMPUTER STATUS: Dr. Seamans released our procurement plan last week. We now hope to have the RFP in the hands of prospective bidders by December 21, 1965. Mr. Webb has invited the presidents (and two or three of their top people) to NASA Headquarters on December 21, at which time the NASA position on computers and computer procurement will be discussed. As part of this show, we have been asked to spend an hour or so presenting our plans and passing out our RFP. Langley is also releasing an RFP and will share this part of the program. We have informed Newby and Davis relative to this plan. ✓

NOTES 12/13/65 JAMES

B 12/13

SA-201: The status of the vehicle will be covered in detail in our Preflight Review starting tomorrow morning. ✓

H-1 ENGINE LOX SEAL FAILURE: Reference your comment on my notes of 12/6/65 (copy attached). We were aware of the seal problem and have been discussing it with the Engine Program Office and Rocketdyne. In fact, it was discussed in our Preflight Review dry run two weeks ago and will be covered in detail at our review tomorrow. Normally we do not report items like this in our Weekly Notes when the problem is the direct responsibility of another program office. We do, of course, follow these items quite closely with the Engine Program Office. ✓

SATURN IB PROJECT SUPPORT AGREEMENT (PSA): After a two month concentrated effort by the various elements of the program office, we have completed the preliminary draft of the Saturn IB PSA. The purpose of the PSA is to define the specific Saturn IB Program requirements to be performed by R&DO and to identify the funds and manpower required to perform the effort. The final PSA will in effect be a "statement of work." We are hopeful that the successful completion of this document and the "negotiation" of it with R&DO will provide us all with a valuable management tool which we have lacked in the past. ✓ The preliminary draft PSA was forwarded to Mr. Weidner 12/3/65 and we expect comments back about January 15. We can then proceed to finalize the document with R&DO. ✓

Lee

Very fine.
But I'd like
to talk to
you about
this business
before you fi-
nalize it, because
of its obvious importance
for AAP. B

12/13

B 12/15

1. S-IC In-House Status and Progress:

a. Dynamic Test Stage: Installation of Lox and Fuel PVC's has been completed. Four engine simulators and one dummy F-1 engine have been installed. The fluid power lines, filter manifold and wrap-around lines are available for installation. ✓

b. First Flight Stage: Shortages which continue to plague the program are the Engine Dome Purge Pressure Switch, Helium Fill and Drain Valve, Lox Flow Regulator, and measuring devices such as Sensing Probes, Transducers, Accelerometers, Leak Meters, etc. Valves and measuring equipment have caused delays and problems in all our programs since the Redstone Missile was built. It would be worthwhile to focus more attention and effort on this area from the management side on future programs such as AAP. ✓

c. Second Flight Stage: Three engines have been installed on this stage during the last week. The two remaining engines will be hung beginning next week. All injector plates have been replaced. The installation of engines has been accomplished exactly on schedule as planned a year ago, although a number of engine components are still missing. The biggest work load exists now in the area of cable installation. Because delivery of cables from Boeing was late and this is peak load for only four weeks, we borrowed ten electricians from Boeing to help us complete this work on schedule. The schedule for -502 is very tight especially with the holiday season coming now. However, we feel we can meet the delivery date of January 17, 1966.

d. In support of Boeing assembled stages, we are again sizing four Lox Tunnels from Parson Company in our shop by use of our magnetomotive devices. Modification of Pre-Valves is also done for Boeing in our Valve Clinic. ✓

2. Support of Insulation Repair at MTF: We are supporting this effort by our personnel at the site since November 17, 1965. It appears that we have been instrumental in helping NAA to establish the processes and equipment necessary for making these repairs. We will continue this support until satisfactory results have been obtained. ✓

Arthur
Rudolph

I agree

B

12/13

B12/15

IN-FLIGHT EXPERIMENTS - We were informed by letter from Dr. Mueller dated Nov. 23, 1965, giving the project resources distribution for FY's 1966-67 that MSFC was provided \$2.0M in FY-1966 and \$.9M in 1967 for In-Flight Experiments. To date four experiments have been approved by the MSFEB. Also approval has been given for conducting feasibility studies on eight other experiments. MSF has indicated that as the experiments are proven feasible and passed on by the MSFEB, additional funds will become available.

We are now working with IO and R&DO to establish a method for managing the In-Flight Experiments work. Although the now approved experiments will be carried on Apollo Saturn IB's, the approved feasibility studies may generate experiments that will be carried on Apollo Saturn V's or vehicles assigned to AAP. A management plan should be generated in the beginning that will provide Center management for all In-Flight Experiments regardless of the program or vehicle to which they may be assigned. We anticipate developing a workable management plan as soon as possible in order to allow initiations to be made against the presently approved \$2.0M FY-1966 program.

VISIT OF MR. GERARDI - Mr. Peter Gerardi called on December 13 to postpone his interview with you on the subject of International Cooperation in Space. He will try to come to Huntsville sometime after the FY-67 authorization hearings, probably in April.

Mr. Gerardi has invited Ray Kline to meet with him early next year to prepare a list of questions that Mr. Gerardi would like to ask you.

The reason for the postponement is preparation for the MOL hearings, involving both NASA and Air Force witnesses, to be held by the Manned Space Flight Subcommittee right after the holidays.

PREPARATIONS FOR FY-67 BUDGET HEARINGS - Bob Freitag has sent the MSF centers an advance list of questions the Teague Subcommittee will ask preparatory to the FY-67 hearings. These questions have been distributed to MSFC elements for the preparation of answers. Stan Smolensky visited MSFC on December 8 to discuss preparations for the hearings.

SATURN IB - (RESPONSE TO YOUR QUESTIONS ON MY NOTES OF 12/6/65) - The Aerospace request to Col. Newman was for data on Saturn IB R&D vehicle costs (SA-201 to 212), therefore, we did not refer Col. Newman to the "new" cost figures. The "new" cost figures (Standard Launch Vehicle Study recently completed by the contractors) relate only to follow-on vehicles (beyond SA-212). We consider the Saturn IB R&D cost figures, to which we referred Col. Newman to be the best, from MSFC's viewpoint, for Aerospace to use.

As a result of your discussions with Dr. Mueller, we are working with Norm Rafel toward gaining acceptance of the "new" figures and subsequently the transmittal of these to DOD. As a part of this effort we are sending a copy of the R&DO evaluation of the contractor study to Norm Rafel.

H.M.

Please
Keep me
informed.I'm
greatly
interested
in the
methodYou will
recom-
mend,
now that
Jerry is
"on board."

B

C812/4

SATURN IB - Col. Newman, the resident Air Force liaison officer to MSFC and the Army Missile Command, contacted us on Dec. 3 regarding Saturn IB R&D Vehicle Costs. The contact resulted from an Aerospace Corporation request to Col. Newman for data for use in their studies of future launch vehicles in the class between Saturn IB and Saturn V. We advised Col. Newman that Aerospace should contact the representative of Space Systems Division, USAF, who participated in the Joint NASA/DOD National Launch Vehicle Study of the fall of 1964. The cost of R&D vehicles was provided to DOD in that study. H.M.

New cost figures, I hope!

NOTES 12/13/65 REINARTZ

958 12/13

B 12/13

No submission this week.

B 12/15

NOTES - 12/13/65 - RICHARD
AS 12/13

Flight Combustion Monitor (FCM): The Technical Systems Office reviewed with representatives of R&D Operations and Industrial Operations the need for the FCM for the F-1 engines and also the Combustion Stability Monitor (CSM) for the H-1 engines. It was concluded that the need for a combustion oscillation monitor is no longer valid. This conclusion is based on actual engine test firings wherein no self-induced oscillations have been experienced with the F-engine (using injector for SA-504 and subs) and with "bomb" test; the oscillation average damp time was 25 ms. ✓

Saturn SA-201 Wind Restrictions: In a meeting with representatives of R&D Operations and Industrial Operations, conflicting requirements for prelaunch wind operation restrictions were reviewed. Recent data from Structures Division (R-P&VE-S) may require amending launch information furnished to KSC. This data is being reviewed by P&VE. Launch Mission Rules for AS-201 are also being reviewed in light of this data. ✓

NOTES 12/13/65 RUDOLPH

B 12/15

Good question!
B

8812/13

SII-?

1. GE & IBM Program Control Center - Based on our recommendations, GE, has developed a Program Control Center and IBM is establishing a Schedule Control System which will include a Program Control Center. The Saturn V Program Control Office assisted GE and will assist IBM in their efforts. These Control Centers will provide much needed Program visibility for the contractors and are designed to support (compliment) the Saturn V Program Control Center.

2. S-IC Stage Incentive Contract Conversion - A complete negotiated package for the conversion from CPFF to CPIF was delivered by the Contracting Officer on Wednesday, 8 December 65, to MSFC for Center review and approval. Target date for submission to NASA Headquarters is Wednesday, 15 December 65. Incentive for 6 weeks early delivery of flight stages is included in the conversion package. ✓

3. S-II Battleship Stage Firing - Now scheduled for Wednesday, 15 December 65. We were unable to fire on Tuesday, 7 December 65 as scheduled due to leak at a feed-through connection in LH₂ tank walls which requires repair prior to firing. ✓

4. S-II-1 Stage Status - LOX tank closeout weld (aft LOX bulkhead to common bulkhead) was completed on Tuesday, 7 December 65, (17.4 weeks behind schedule).. ✓

5. S-IVB-501 Stage Status - The stage remains in the checkout tower at Huntington Beach with continuity checks continuing. DAC continues to predict completion of post-manufacturing checkout by Saturday, 22 January 66. ✓

6. ESE/GE Schedule Commitments - GE has committed to Saturn V ESE deliveries as follows:

SDF complete by February 1, 1966.

IU C/O Station complete by February 1, 1966.

LC 39-1 complete by March 1, 1966. ✓

7. Voyager Program Quarterly Review - Is scheduled for Thursday, 20 January 66, at Headquarters. Launch Vehicle Systems will be an agenda item. ✓

8. S-IVB LOX/Hydrogen Burner - Reference your comment to Notes 11/22/65 Rudolph (copy attached). Item discussed was the helium heater. ✓

Attachment: Notes 11/22/65 Rudolph (DIR, I-DIR and R-DIR's copy only)

NOTES 12/13/65 SPEER

12/13

B 12/15

1. APOLLO SHIPS: A special meeting was held at Headquarters on availability of Apollo support ships. It was quite obvious that a serious conflict exists between NASA requirements and scheduled availability of the ships. This conflict could possibly cause a schedule impact on AS-204. Since the requirement concerns primarily the spacecraft, MSC is leading a joint Air Force - NASA investigation on possible alternatives. ✓
2. USE OF BREADBOARD FACILITY FOR LIEF: Arrangements are being made with R-ASTR and R-TO to tie the Saturn IB System Development Facility (Breadboard) into LIEF for the AS-201 launch to have it available for near real time simulations if required. You may recall that this facility was very useful during the SA-8 countdown. ✓
3. LIEF PRESENTATION TO FORDYCE: A short presentation on LIEF was given to Sam Fordyce (Flight Operations Office within MSF AAP Office) as a part of the Computation Laboratory presentation on data processing capabilities at MSFC. ✓
4. OPERATIONS DOCUMENTATION: A presentation was given to the Technical Systems Council, at their request, on Operations Documentation. The primary purpose of the presentation was to show the relationship of the Operations Documents to the Design Documents. It is felt that the discussion was beneficial to all participants. ✓
5. AS-201 PRE-FLIGHT REVIEW: A dry run of the Mission Operations portion of the AS-201 Pre-Flight Review was held on 12/8/65. There are no major problems from the operations standpoint concerning this launch. The mission operations part of the review will be presented on December 15. ✓

B 12/15

9512113

1. PEGASUS: No significant changes. Dr. M. Yarymovych, Technical Director of the MOL Project, and I discussed latest results of Pegasus on December 10. He is greatly interested in launching another Pegasus with a Titan in order to obtain a meteoroid penetration data point for 1 to 2 mm Al. This measurement would also be of great significance for the S-IVB Workshop project. ✓ Extrapolation of present Pegasus results into this region is uncertain by a factor of 10 to 20; puncturing probability during a 45 day mission may be as high as 20% and even 50%. ✓

2. AAP: Lunar Systems - Dr. N. Costes, RPL, is presently serving on a Headquarters (Ed Gray) Ad Hoc Working Group to study requirements and capabilities of probes to be launched from a manned lunar orbiter toward the lunar surface. These probes are expected to provide data on the structure of the surface. The cost of this program, as presently quoted, is surprisingly high, above \$100. Million. Why don't they adapt one of the many existing military guided missiles? E.S.

Earth Orbit Systems - The list of scientific experiments available for early AAP flights (209; 211; 212) is remarkably short. A considerable effort at an early time will be required if these flights are to be utilized for scientific experiments. ✓

In an attempt to clarify existing plans for astronomical systems for AAP flights, I met with Drs. Schwarzschild, Spitzer, and Danielsen (Princeton University), N. Roman (OSSA-Headquarters), and W. Green (OMSF-Headquarters). The earliest astronomical system for manned operation (picture-taking telescope), a modified OAO, could be available in 1971 or 1972, provided that funding for the project is obtained. For earlier flights, the Optical Technology Experiment initiated by Astrionics appears to be the only contender as far as manned astronomical systems are concerned. Dr. Roman fully endorses this project. It is not likely, however, that OSSA will be able to help fund it.

3. NASA-UNIVERSITY RELATIONS: Dr. Otis Lancaster, a Westinghouse professor of Engineering Education at Penn State University, visited MSFC on Monday, December 6. Dr. Lancaster is at present working in Dr. Smull's Office of Research Grants and Contracts, NASA Headquarters, on the relationships of the universities and NASA with regard to engineering research. We emphasized to Dr. Lancaster the urgent need for elimination of red tape in the evaluation of proposed research work, and for direct contact between university research groups and Field Centers. ✓

E.S.
Request
a
briefing
on this
entire
subject,
incl.
"OAO
supported
by
nearby
SIB
Workshop"
Also:
"crew
radiation
hazards in
synchr. orbit."
B

E.S.
Has anyone
ever looked
at that
possibility?
"Optimizing"
to the tune
of \$100 M
new develop-
ment work
is silly.
B

B 12/15

12/13

1. E. Z. Gray Visit. Ed Gray will be at MSFC on Tuesday, 12/14/65, arriving on the morning flight from Washington (10:25 a.m.) and departing on the afternoon flight to Washington (4:40 p.m.). He has made no request to me to see you or Mr. Weidner and I have tentatively schedule a complete day for him as follows:

10:45 - 1:00	ASO study program FY 65, 66, 67 and *CPFF vs. fixed price contracts
1:00 - 2:00	AAP contracts (excluding integration)
2:00 - 4:00	S-IVB Workshop

*During the past few years we have had several contract overruns in the study program. Although the dollar value was small (a few thousand dollars), it still went into the record as a contract overrun and Seamans' staff wants to keep the number of contracts with overruns down. We were, therefore, directed to use fixed price contracts this year (or show reason for not doing so). We have made an honest effort to go the fixed price route; however, we have run into some lengthy delays (approximately 4 months to negotiate a contract vs. a couple of weeks which had been our experience on CPFF). Advanced Systems Office and the Purchasing Office would like to go back to CPFF and have documented a case, on the basis of our experience, to convince Headquarters we should do so. Also, we have devised a method which will eliminate cost overruns on CPFF study contracts which should remove the basic cause for the change to fixed price in the first place. Basically, we are preparing the material for Ed and his procurement people to use in our behalf to get the "policy" changed and he supports us 100% (provided we have a good story). This has been a joint ASO-Purchasing Office effort. ✓

FW
Good
luck!
B

2. S-IVB Workshop. Activities are well underway for the December 16 MSFC review and the Management Council Meeting and presentation on the S-IVB Workshop. Although the time is extremely short and the conversion of our plans from an unpressurized version on 211 to a pressurized version on 209 was a rather major one, I feel we will have a relatively good story. The support from the labs as well as Lee James' office has been outstanding; everyone is really pitching in, even though a few of the major points are still a little fluid. In general, the Thursday meeting will be one in which we will make an internal appraisal of where we stand, what can be done on 209, what will it cost (manpower and dollars), and what is our role. The Thursday meeting is not intended to be a dry run for the Management Council Meeting. I will have a proposal for the Management Council Meeting, and in general the slides, etc., which will be required will be shown during the Thursday meeting, but not in the same context or format. I have invited MSC and KSC to our 12/16/65 meeting and hopefully they will make a short presentation giving their Centers' requirements, etc. ✓

December 20, 1965

No action items for Mr Gorman

1494

MSFC ROUTING SLIP				
	CODE	NAME	INIT.	<input type="checkbox"/> ACTION <input type="checkbox"/> INFORMATION
1	DIR	Dr. W. von Braun		
2				
3				
4				

11-20
1-20
1-17
Show David

File 12-20 Notes

REMARKS

In answer to your question on my Notes of December 20, I attach Dr. Dozier's reply. We will keep you informed of further test results.

Herman Weidner / Harry McCall
 Fred Cline
 Bill Lucas
 Frank Williams

FYI
 B 1/19



CODE R-RP-DIR	NAME STUHLINGER	DATE 1-10-66
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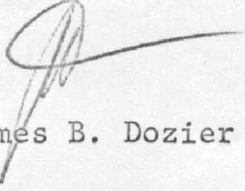
MSFC - Form 183 (Rev. February 1961)

January 6, 1966

Dr. Stuhlinger:

The simple answer to Dr. von Braun's question in paragraph 1 is "yes."

In the impact tests conducted at AEDC, a .16 mm Al particle at a velocity of 3.6 to 5.0 km sec⁻¹ barely penetrated the Al wall of the SIVB tank but did not go through the foam and fiberglass LH₂ heat insulation on the inside of the tank. When the velocity of the same particle was increased to 7.5 km sec⁻¹, it penetrated the Al wall and the foam but still did not rupture the interior fiberglass lining of the tank.



James B. Dozier



B 12/29

1. PEGASUS: No significant changes. Impact tests at AEDC with high velocity particles on S-IVB tank wall samples gave the preliminary result that 0.16 mm Al projectiles required velocities between 3.6 and 5.0 km sec⁻¹ to penetrate the outer Al skin, but a velocity increase to 7.5 km sec⁻¹ still failed to rupture the fiberglass lining. Further tests are underway which are expected to provide sufficient data for a realistic estimate of the puncture probability of the S-IVB tank. AEDC has agreed to perform impact tests on small sample tanks filled with oxygen.

E.S.

2. AAP - LUNAR EXPLORATION: Following Dr. Mueller's recent comments on the LSSM, we prepared a 14-day scientific lunar surface mission which uses as a mobility aid an austere LSSM. Discussions were held with ASO, LSSM contractors (Boeing and Bendix), and OMSF representatives. We feel that a meaningful scientific 14-day mission with a simplified LSSM can indeed be carried out.

the interior of the SIV tank? heat insulation of the SIV tank? B

Request briefing B 12/29

EARTH ORBIT SYSTEMS: I met with Drs. Pieper, Bogges, and Hallam of GSFC to discuss possibilities of preparing astronomical projects with astronaut participation for early AAP flights. While the interest in such projects is great, it is not likely that any manned astronomical project can be developed in time for a 1969 or even 1970 flight. It is the feeling of GSFC astronomers that optical technology experiments in which basic problems of diffraction limited telescopes in space are studied would be very useful to astronomers. Members of ASO, Astrionics, and RPL are presently working on an optical technology experiment program for early AAP flights.

E.S.
I'd also like to chat with you about all this. Informal suggest just you and me B

3. ART/SRT AND SUPPORTING DEVELOPMENT FY-1966 PROGRAM STATUS:

	<u>Annual Plan</u>	<u>Program Authority</u>	<u>Processed To FMO</u>	<u>Obligated</u>
OART	\$16,154,000	\$15,654,000	\$6,405,545	\$ 754,407
MSF (904)	9,450,000	9,450,000	1,784,646	721,085
OSSA	5,903,000	438,000	308,071	1,000
OTDA	1,500,000	1,500,000	239,055	0
TOTALS	\$33,007,000	\$27,042,000	\$8,737,317	\$1,476,492

A number of tasks are presently under preparation in the Laboratories for commitment before December 31. We hope to have a substantial portion of the OMSF Program (904) committed by that time.

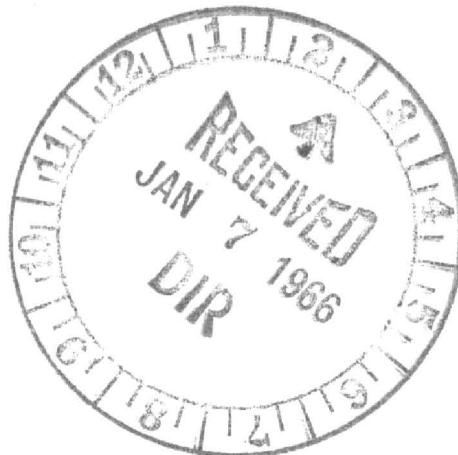
1490

MSFC ROUTING SLIP					
	CODE	NAME	INIT.	<input type="checkbox"/> ACTION	<input type="checkbox"/> INFORMATION
1	DIR	Dr. von Braun			
2		B 1/17			
3	direct				
4	TS 1/16				

REMARKS

Attached are the MSFC Experiment Guidelines as requested, Notes 12-20-65 - DANNENBERG.

file w/ ↑



CODE R-S	NAME Dannenberg	DATE 1-7-66
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NOTES 12-20-65 DANNENBERG

B_{12/21}

QTS 12/20

1. Experiment Coordination

Program Authority Release (PAR) was being processed by Financial Management Office to provide R&DO \$1.6 million to fund MSFC Experiments #1 through 9. ✓

Guidelines for initiating action to implement MSFC Experiments #1 through 9 have been furnished to R&DO Laboratories. ✓

Level I Change Control Board has approved weight assignment for the following MSFC experiments:

MSFC #1/AS 205 - 300 lbs.

MSFC #1 and 2/AS 206 - 350 lbs.

A working group for coordination and definition of "Workshop" experiments has been established by R-AS. The Secretary of the ERB, designated to coordinate the approval of such experiments, has issued draft "Procedure for Proposing In-Flight Passenger Experiments on Apollo and Apollo Applications Missions". ✓

The next MSFEB meeting is scheduled for 1-17-66 in Washington, D. C. ✓

2. ICD Management

The status of ICD's was clarified with S & ID personnel. All available ICD's were reviewed, discussing simultaneously the MSFC philosophy of ICD management. NAA agrees that proper interpretation of ICD plans will reduce the total number required considerably. NAA is now reviewing the available 32 ICD's and will advise of additional requirements they believe should be added. ✓

K.D.

Please
send
me
copies

B

GEORGE C. MARSHALL SPACE FLIGHT CENTER
HUNTSVILLE, ALABAMA

file

Memorandum

DEC 23 1965

TO : Mr. Cline, R-P&VE-DIR

DATE

cc's rec'd.

Mr. Capowski

Mr. Hoja

FROM : Director, R&D Operations, R-DIR

SUBJECT: MSFC In-Flight Experiments Program

MSFC has received notice of funding and authority to carry out the currently MSFEB-approved experiments program covered in Enclosure 1.

R-P&VE is designated as the lead laboratory for these approved experiments.

It is anticipated that funding authority will be issued to R-P&VE by January 1, 1966, to permit initiation of the program.


In connection with this assignment, I should like to discuss with you in the near future your organizational plans as lead laboratory to manage these assigned programs. As a preliminary to such discussions, it is requested that you initiate for each of the experiments, or, at your discretion, for groups of compatible experiments, program development plans defining management requirements and structure, schedules, budgetary requirements, and support requirements from other Research and Development Operations Laboratories. In defining schedules and reporting procedures, consideration should be given to the requirements as specified and implied in NASA Policy Directive NPD 7121.1 (Enclosure 2). Additionally, attention should be given to specifying and developing methods applicable to providing those data required to assure effective co-ordination of the effort of the several supporting R&DO laboratories.

It is intended that other experiments as they are approved will be assigned for execution to the laboratory having major or primary disciplinary interest. However, it is necessary to assure that not only the resources of the lead laboratory but the total competence of the R&DO be available as required for the conduct of the experiments. To this end, I am requesting that each laboratory initiating or sponsoring an experiment provide a preliminary program development plan developing an estimate of the support resources required for execution of the experimental program.

Info copy Mr. D. J. [unclear]

I hope to have developed, prior to our discussion of your organizational plans, a basic organizational structure and operational procedures to assure smoothly working relations among the various R&DO elements participating in the In-Flight Experiments Program. I shall welcome your views in this matter.

Pending further development and resolution of the basic principles involved in overall management and operational relationships between R&D Operations and IO for the Apollo Applications Program, the Technical Staff, R-S, will carry out the overall coordination and management aspects of this program for R-DIR.



Hermann K. Weidner

2 Enc:

a/s

cc:

R-DIR, Dr. McCall
R-DIR, Mr. Cook
R-DIR, Mr. Magliato
R-DIR, Dr. Johnson
R-AS-DIR, Mr. Williams
R-OM-DIR, Col. Fellows
R-S-DIR, Mr. Dannenberg
R-TO-DIR, Mr. Richard
R-AERO-DIR, Dr. Geissler
R-ASTR-DIR, Dr. Haeussermann
R-COMP-DIR, Dr. Hoelzer
R-ME-DIR, Mr. Kuers
R-QUAL-DIR, Mr. Grau
R-RP-DIR, Dr. Stuhlinger
R-TEST-DIR, Mr. Heimburg

**GUIDELINES FOR FUNDING REQUIREMENTS
FOR
MSFC IN-FLIGHT EXPERIMENTS**

(Dollars in Thousands)

	<u>FY-66</u>	<u>FY-67</u>	<u>TOTAL REQUIREMENTS</u>
1. Approved Experiments			
P&VE Laboratory			
a. Approved for Flight			
MSFC #1 - Dielectric Materials	\$800	\$150	\$950
MSFC #2 - Thermal Control	310	150	750
MSFC #3/4 - Propellant Mass/ Liquid Interface	220	300	1,600
b. Approved for Feasibility			
MSFC #5 - Boiling Heat Transfer	20		
MSFC #6 - Propellant Transfer	50		
MSFC #7 - Superinsulation	50		
MSFC #8 - Mechanical Properties	75		
MSFC #9 - Lubrication	75		
Total P&VE	<u>\$1,600</u>	<u>\$600</u>	<u>\$3,300</u>

MATERIAL TRANSMITTED

1. NPD 7121.1 "Phased Project Planning," effective October 28, 1965. This Directive prescribes agency-wide policy and guidelines for the planning, approval and conduct of major research and development projects.
2. This is a new issuance. Special advance copies of this Directive have been furnished to Officials-in-Charge of Headquarters Program and Staff Offices and Directors of Field Installations.
3. This Directive is of particular significance to the management of the NASA program and should be circulated to all key personnel.

Special Advance Copy

FILING INSTRUCTIONS

1. File in standard 3-ring binder in numerical sequence, without regard to the alphabetic prefix which identifies the type of issuance.

October 28, 1965
Effective date

Policy Directive

SUBJECT: PHASED PROJECT PLANNING

1. SCOPE AND APPLICABILITY

This Directive prescribes agency-wide policy and guidelines for the planning, approval and conduct of major research and development projects.

2. DEFINITION OF MAJOR RESEARCH AND DEVELOPMENT PROJECT

A major research and development project is one that requires significant agency resources or involves important external relationships, and will typically encompass design, development, fabrication, test and flight operation of major aeronautical and space hardware. Examples of such major projects are VOYAGER, AOSO and other spacecraft of observatory complexity, the Hypersonic Ramjet Experiment, further utilization of Apollo systems, and post-Saturn launch vehicles.

3. BACKGROUND

Over the past year, considerable attention has been devoted to the improvement of the agency's program/project management and, particularly, the planning and approval processes related thereto. This effort has developed an incremental or phased approach which, based on limited applications in several major areas, has demonstrated many potential benefits. Accordingly, this concept is being introduced for agency-wide application at this time. Phased Project Planning is not an end in itself but represents a major step in evolving a management pattern of maximum effectiveness in the application of agency resources to its tasks.

4. POLICY

- a. It is NASA policy to conduct research and development projects in an appropriate number of sequential phases. Each phase is a specifically approved activity undertaken after review and analysis of preceding effort. Each phase is a coherent focused effort with definable end objectives and represents a specific limited agency commitment, both internally and externally.

October 28, 1965

- b. Major projects (as defined in paragraph 2, above) will normally be conducted in four sequential phases, each of which must be approved by agency top management: Phase A - Advanced Studies, Phase B - Project Definition, Phase C - Design, and Phase D - Development/Operations.
- c. The conceptual framework of these phases is as follows:
 - (1) Phase A effort involves the analysis of a proposed technical agency objective or mission in terms of alternate approaches or concepts, and the conduct of that research and technology development requisite to support that analysis and to assist in determining whether the proposed technical objective or mission is valid.
 - (2) Phase B effort involves detailed study, analysis and preliminary design directed toward the selection of a single project approach from among the alternate approaches resulting from Phase A activities.
 - (3) Phase C effort includes the detailed definition of the final project concept, including the system design and the breadboarding of critical systems and subsystems, as necessary to provide reasonable assurance that the technical milestone schedules and resource estimates for the next phase can be met, and that definitive contracts can be negotiated for Phase D.
 - (4) Phase D effort includes final hardware design and development, fabrication, test, and project operations.
- d. Throughout each phase of activity, emphasis shall be placed on identifying those aspects of the proposed project that require the development of technology beyond the present state of the art and the specific manner in which this technology is to be developed.
- e. The specific content and timing of any phase is a function of the project itself, and maximum flexibility will be provided in this regard. There must, however, be strict adherence to the fundamental concept of agency top management participation at all major decision points. These decision points will be prominently identified in all planning documents, as applicable. To avoid discontinuity in the total project effort, the findings, assessments and recommendations stemming from any phase will be presented to agency top management for review and decision in ample time to permit considered action in advance of the termination date of the phase currently underway. Agency top management participation in these key decisions will consider not only the immediate technical and program aspects, but also will assess the long-range implications in terms of policy, resources and interagency relationships.

- f. Maximum competition will characterize the phase-by-phase increments of project execution. For example, in connection with those preliminary and conceptual mission studies that are generated by the in-house advanced research programs, there will be a maximum competitive utilization of industrial resources for supplementary assistance. Integration of complementary in-house and industry effort will be managed to establish an association that uses the best competence of each sector as early as possible in each phase of a project.

5. DESIRED BENEFITS

Phased Project Planning will:

- a. Develop the maximum number of options and opportunities for future aeronautical and space projects;
- b. Provide options that will give the maximum annual and long term budgetary flexibility;
- c. Provide the means for critical investigations of the most feasible project approaches;
- d. Permit the final selection of projects for execution on the basis of sound technical concepts, established in-house management and contractor teams, and with the full understanding of the resource, schedule and other pertinent factors involved;
- e. Provide a framework for clearly understood delegations of authority and responsibility down to the lowest level of management;
- f. Permit more effective and flexible allocation of existing resources as well as planning for their future use;
- g. Minimize the agency's risks as well as those of contractors;
- h. Provide a major tool in the control of schedules and costs without compromising technical objectives or penalizing participating contractors;
- i. Provide the basis for better integration of project planning and execution with overall agency programming and more effective approaches to procurement and contractor selection; and,
- j. Provide for more effective interagency coordination in development of a total project plan.

6. RESPONSIBILITY

- a. The Deputy Associate Administrator for Programming is responsible, in conjunction with the Deputy Associate Administrators for Industry Affairs and Administration, for the development and publication of detailed guidelines and instructions necessary to implement Phased Project Planning.
- b. Headquarters Program Directors will review their current program in the light of this policy and, pending the issuance of detailed guidelines and instructions, will carry out their responsibilities in accordance with the general philosophy and concept of Phased Project Planning as contained herein.

7. IMPLEMENTATION

The implementation of this policy will begin immediately. As is the case with all of NASA's major management approaches, the evolutionary aspect of the phased project planning process must be stressed. The application of this policy will be reviewed closely in a continuing, organized manner.

James E. Webb
Administrator

DISTRIBUTION:

SDL 1

NOTES 12/17/65 BALCH

B 12/29

(K) 12/20

Higher Education for MTF Personnel - MTF representatives met with the Mississippi Board of Trustees of State Institutions of Higher Learning and discussed the need for facilities for postgraduate study near MTF. ✓

Legislative Liaison - MTF representatives met with Mr. Marx Huff, Assistant to Senator Stennis and briefed him on the status of MTF activities. ✓

Labor Relations - The UAW lost its election held at MTF on 12/15/65 to determine whether S&ID technical personnel at MTF desired bargaining representation by the UAW. ✓

S-II-T Stage - Removal of the forward skirt in order to take out foreign objects trapped under the membrane seal around the forward LH₂ bulkhead is scheduled to start not later than 12/21/65. Insulation repair is continuing, with minor difficulties caused by rainy weather. ✓

Technical Systems - Negotiations have been completed for the continuation of Aetron as installation contractor for Phase I technical systems. The new end-date for the contract is 5/30/66. Aetron has established a new construction division that will actually perform the remaining installation work. Video has completed its installation work for Aetron and is scheduled to leave the site on 12/20/65. ✓

S-II Test Stand A-2 and GSE - Cold shock and flow test of LOX transfer system is planned to be performed not later than 2/20/66. Turned over instrumentation systems to S&ID on 12/15/65. A7-71 Heat Exchanger has been tested at MSFC and is being prepared for shipment to MTF. Design requirements have been relaxed to permit its use without modification. ✓

J-2 ENGINE QUAL testing of the J-2 engine at the 200K level was completed Friday, December 17. The formal test program included 30 tests for 3,774 seconds. A total of 225 critical limits was met. The only abnormality was a premature cutoff caused by a ground test instrumentation boss failure.

The prenegotiation conference with the NASA Headquarters incentive team concerning the combination of the J-2 Contracts and sustaining engineering will be held at Marshall December 28, 1965.

The R&D engine failure mentioned last week has been attributed to contamination in a filter in the gas generator fast shutdown valve control line. This filter is an R&D component and is not installed on delivered production engines.

Production engine J-2046 was delivered to DAC for S-IVB 206. Engine J-2048 was delivered to Test Division for the in-house Battleship Program.

The harness on engine J-2033, installed on the S-IVB 501 stage, was overheated and damaged while Rocketdyne was putting a pressure probe in the augmented spark igniter. Engine J-2031, already delivered to DAC for S-IVB 205, will be installed in the S-IVB stage 501. The cable will be replaced on engine J-2033 and this engine will be installed in the S-IVB 205 stage.

RL10 ENGINE Various methods of eliminating Centaur LOX tank vaporization (which occurs after sustainer engine cutoff during the eight-second coast before RL10 engine start) are being evaluated. These methods are: (1) increased tank pressure (2 psi); (2) reduced LOX temperature (subcooled LOX or helium bubbling); and (3) increased engine chilldown (from five to eight seconds). It has been determined that the S-II and S-IVB stages do not have this problem because of higher tank pressures, higher ullage thrust, and preconditioned propellants.

The last of the seven prototype RL10A-3-3 engines has completed acceptance tests and is being prepared for shipment. Delivery of RL10A-3-3 engines for operational vehicles will begin in May 1966.

F-1 ENGINE On December 14, 1965, R&D engine 029 experienced a LOX pump explosion at 110 seconds into the test run. This engine had accumulated 41 tests for 5,070 seconds. The turbopump had 5,378 seconds of run time. The engine was operating at 1521K site thrust and normal conditions were recorded prior to the failure. The cause of failure is not known at this time. In view of the run time age on this particular engine, no program impact is anticipated. Facility instrumentation and wiring damage was extensive. Roll-up doors and some weather shielding were damaged. Some bending of minor bracing members was experienced. Estimated facility repair time is three weeks to one month.

Turbopump E-2030 for engine F-5031 had a peripheral separation of the turbine shroud during component testing. Possible corrective action is to increase the thickness of material in the failed areas. The alternative would be to go back to the old three piece design. Program impact, if any, is not known at this time. A "corrective action" decision effecting engine F-5029 and subsequent will be made after about two more weeks of investigation. The turbopump test facility will be under repair for a minimum of three weeks. Facility damages include instrumentation and wiring. Wiring on positions 2B and 2C was damaged but will be operational by December 20, 1965.

Engine F-4027 (spare for S-IC-2) was accepted on December 10, 1965, for shipment to MSFC in late December.

H-1 ENGINE Twelve (12) 205K engine acceptance firings have occurred to date with the "flat" type gasket on the main pump shaft and the dual drain lines installed. Two of the firings have been terminated due to temperature spikes below red line in the LOX seal cavity area during engine start, but there have been no occurrences of LOX carbon seal breakage recorded during these firings.

NOTES 12-20-65 CLINE

FS 12/20

B 12/29

NEGATIVE REPORT

NOTES 12/20/65 CONSTAN

B 12/29

Q8 12/20

COMPUTER OPERATIONS SERVICES

Result of negotiations with Ling-Temco-Vought and Telecomputing Services, Inc. was presented to MSFC management on Tuesday, December 14, 1965, to Office of Manned Space Flight on Wednesday, December 15, 1965, and to the NASA Administrator on Thursday, December 16, 1965. It is expected that Mr. Webb will select a contractor no later than Monday, December 20, 1965. ✓

NOTES 12-20-65 DANNENBERG

B 12/20

9/18 12/20

1. Experiment Coordination

Program Authority Release (PAR) was being processed by Financial Management Office to provide R&DO \$1.6 million to fund MSFC Experiments #1 through 9. ✓

Guidelines for initiating action to implement MSFC Experiments #1 through 9 have been furnished to R&DO Laboratories. ✓

Level I Change Control Board has approved weight assignment for the following MSFC experiments:

MSFC #1/AS 205 - 300 lbs.

MSFC #1 and 2/AS 206 - 350 lbs.

A working group for coordination and definition of "Workshop" experiments has been established by R-AS. The Secretary of the ERB, designated to coordinate the approval of such experiments, has issued draft "Procedure for Proposing In-Flight Passenger Experiments on Apollo and Apollo Applications Missions". ✓

The next MSFEB meeting is scheduled for 1-17-66 in Washington, D. C. ✓

2. ICD Management

The status of ICD's was clarified with S & ID personnel. All available ICD's were reviewed, discussing simultaneously the MSFC philosophy of ICD management. NAA agrees that proper interpretation of ICD plans will reduce the total number required considerably. NAA is now reviewing the available 32 ICD's and will advise of additional requirements they believe should be added. ✓

K.D.

Please
send
me
copies
B

B 12/29

FS 12/20

1. Support Contractor Evaluation: The MSFC Support Contract Performance Evaluation Board concluded the first evaluation cycle of the first six months operations of the eleven support contractors. Evaluation proceedings are clearly established and the system is working smoothly. The laboratory directors have commented that contractor performance has been equal to or better than that which had been experienced under the prior CPFF contracts. ✓ The support contractors, without exception, were complimentary in their comments to the Performance Evaluation Board about the MSFC CPAF contracting concept and its implementation. ✓

2. Space Vehicle Laboratory: On my 12/13/65 NOTES, you asked who took out the Space Vehicle Laboratory for Research Projects Laboratory from the FY-67 C of F reclama. Information from Stan Smolenski, Center Development Office, MSF, is that Mr. Webb's office withheld a sizeable portion of the total NASA reclama because of present budget uncertainty. The Space Vehicle Laboratory, per se, was not under fire but was caught in a broad budget review. On the assumption that the facility project cannot be reinstated, Mr. Read of my office met with Dr. Stuhlinger on December 14 to discuss ways of providing adequate facilities for Research Projects Laboratory. We are planning a repair and alterations project and are investigating reassignment of necessary physical space. These actions will provide facilities for RPL which, although not as complete and useful as the proposed C of F facility, will improve the laboratory's capability to perform its mission work.

Scott F and How. Heidner

I think now that we've lost the Space Vehicle Lab for the 3rd time, we should really make a major effort to provide RPL with better facilities. As we go deeper into AAP, we need more first-class scientific personnel, and modern and attractive facilities are a prime requisite to get them (and hold the ones we have).

"Repair and alteration projects" seems to be the right approach, and maybe a few space re-assignments within R&D O will also help. Please let me know where I can be of assistance. B

B 12/29

QTS 12/20

1. S-IC-1 CHECKOUT: Checkout of the S-IC-1 stage was delayed three (3) days due to GSE failure. Problems have been resolved and checkout is again in progress. ✓
2. S-IVB PROGRAM: Post firing modification of the S-IVB-202 stage has been completed and the stage is now in poststatic checkout. Present schedule for shipment to KSC is January 13, 1966. The S-IVB-203 stage is in the Beta I test stand in the early stages of poststatic checkout. Static firing is scheduled for February 9 with an alternate date of February 16. Shipment to KSC is presently scheduled for March 25, 1966. Simulated flight tests have been completed on the S-IVB-204 stage. All tests scheduled for the postmanufacturing checkout of this first manned flight stage have now been completed. It now appears that this will be the first stage to be checked out in the VCL at SACTO. ✓

NOTES 12/20/65 HAEUSSERMANN

B 12/29

AS-501 CONTROL SYSTEM: Control system design effort to prescribe control gains, shaping networks and sensor locations for AS-501 has been completed. ✓ The release for implementation was 12/17 as scheduled. The design uses the EDS-control triple redundant rate gyro package in the IU. ✓ RC networks are in all channels except S-IVB pitch-yaw which has RLC networks. ✓

PU GUIDANCE-SLOSH DYNAMICS STABILITY: Flight Dynamics Branch has initiated a crash program to analyze and simulate the vehicle dynamics associated with the recently identified PU guidance-slosh dynamics stability problem. ✓

ST-124 THERMAL ISOLATION: A meeting was held 12/8 at P&VE Laboratory concerning discovery by Astrionics Laboratory in the thermal vacuum tests that ST-124 mounting bracket has shown excessive heat from the skin to the platform. For optimal performance of the gyro and accelerometer, a thermal isolation from the skin to the platform must be accomplished. P&VE Laboratory proposed to develop design for S-IU-203 and give to IBM for production; ECR will be prepared by P&VE Laboratory. ✓

B 12/29

QD 12/20

S-IC-T

Test S-IC-15 was successfully conducted at 3 p.m. on December 16, 1965. Cutoff was given by console operator as planned at 41 seconds of mainstage. ✓

The present plan is to remove S-IC-T from the test stand on January 17, 1966. The test stand will "require" general refurbishment prior to additional static tests. ✓

S-IVB - (MSFC)

Test No. S-IVB-011 was conducted on December 17, 1965, for a duration of 432 seconds. The primary test objective for this test was the 204 type PU electronics system and the "old Iox PU probe" to get a baseline run. The next test (S-IVB-012) will have the "new modified Iox PU probe" and the 204 type electronics. All other test objectives were met successfully. The next test, S-IVB-012, is tentatively scheduled for the first week in January 1966. ✓

STAGE 202 - SACTO

Checkout activity is progressing slowly, but is expected to increase after the holidays. The first firing is tentatively scheduled for February 9, 1966, with a second firing on February 16, 1966, if necessary. Based on this schedule, the shop date of the vehicle from Sacramento is March 24, 1966. ✓

S-II BATTLESHIP (SANTA SUSANA)

The firing attempted this week was scrubbed on Saturday p.m., when first the pump inlet temperature on Engine No. 5 was indicated out of the start limits. Then the ECA of sequence lost engine ready signal. The No. 3 and 4 start tank valves were apparently leaking, which caused the test to be scrubbed after several attempts to go into the automatic sequence.

Barge Poseidon

Barge Poseidon completed Voyage No. 1 and arrived at Michoud December 18, 1965. The voyage from start to finish was one of the roughest we have experienced. Maximum roll experienced was $17\frac{1}{2}^{\circ}$ in a 6 second period. This was off Tortugas in cross coaming seas averaging 16 foot high waves with length approximately 75'. The vessel, in general, performed very satisfactorily. The only damage incurred was some sections of the cargo deck cover worked loose and leaked. ✓

NOTES 12-20-65 HOELZER

AS 12/20

B 12/29

Negative Report.

NOTES 12/20/65 JAMES

B 12/29

NS 12/20

SATURN IB ESE: On 13 December 1965 I went to Daytona Beach, Florida, together with Bob Aden, Porter Dunlap, Mr. Murphy, Col. LaHatte, and Dr. Lanzkron to investigate the feasibility of moving the remainder of the G.E. Saturn IB ESE project to Daytona. You recall the manufacturing and certain other functions are there now for Saturn IB. This move would collect all the Saturn IB ESE functions, particularly sustaining engineering. The G.E. presentation was lacking in two areas. We will review their resubmission in these two areas with a view to making this change. Besides applying the Daytona organization to the Saturn IB program, the proposed move would free G.E. management and other talent available at Huntsville for the LC-39 task. We plan to start the move by the end of the year, completing by March 1 to 15, 1966. ✓

PROJECT SUPPORT AGREEMENT: Reference my notes 12/13/65, copy attached. I am available to discuss the PSA with you at your convenience. The purpose of the PSA is to establish a method for conducting our relationships with R&DO in a businesslike manner. We do not plan any distribution or discussion of the PSA outside of MSFC. ✓ I feel it is proper that we continue with the implementation of the PSA to establish our Program on a sound basis. Any connection with AAP, which would cause us to want to deviate from our original plans, will not be hampered by this agreement. ✓

IU-203: Late changes, primarily associated with the LH₂ experiment and other new items on SA-203, appear to impact up to a one month slip in scheduled delivery. The changes affect cables and distributors for the most part. With strong assistance from R&DO, we should be able to recover some of the slippage. ✓

Haus
Maus
Your
comment
is
invited
B

La Valle
WJH
14

NOTES 12/13/65 JAMES

SA-201: The status of the vehicle will be covered in detail in our Preflight Review starting tomorrow morning.

H-1 ENGINE LOX SEAL FAILURE: Reference your comment on my notes of 12/6/65 (copy attached). We were aware of the seal problem and have been discussing it with the Engine Program Office and Rocketdyne. In fact, it was discussed in our Preflight Review dry run two weeks ago and will be covered in detail at our review tomorrow. Normally we do not report items like this in our Weekly Notes when the problem is the direct responsibility of another program office. We do, of course, follow these items quite closely with the Engine Program Office.

SATURN IB PROJECT SUPPORT AGREEMENT (PSA): After a two month concentrated effort by the various elements of the program office, we have completed the preliminary draft of the Saturn IB PSA. The purpose of the PSA is to define the specific Saturn IB Program requirements to be performed by R&DO and to identify the funds and manpower required to perform the effort. The final PSA will in effect be a "statement of work." We are hopeful that the successful completion of this document and the "negotiation" of it with R&DO will provide us all with a valuable management tool which we have lacked in the past. The preliminary draft PSA was forwarded to Mr. Weidner 12/3/65 and we expect comments back about January 15. We can then proceed to finalize the document with R&DO.

NOTES 12/20/65 KUERS

B 12/29

B 12/20

1. Technology Utilization Support: This Laboratory has responded to a request from the Navy Department through NASA Headquarters and approved by Mr. Gorman to provide and demonstrate magnetomotive forming equipment at the Ingalls Shipbuilding Company at New Orleans. Equipment and operating crews were at New Orleans within 10 days after receiving the formal request. ✓

2. LEM Mock-Up: The LEM mock-up received from Grumman has been assembled and may be seen in our mock-up building. ✓

3. S-II: In order to verify the design and resolve some of the problems in handling, application and repair of the double seal insulation as applied to a structure similar in size to the S-II vehicle, P&VE, Test and ME Laboratories are holding joint meetings for the purpose of determining what is required to insulate a S-IC shortened container utilizing the double seal insulation concept. Such a container from S-IC-S is available. ✓

Shes
Let's go
out and
take a look
at it
B

9/18/12/20

APOLLO COST STUDY UPDATE - Dr. Mueller has requested an update of the Apollo Cost Study. This study was conducted about a year ago by a team directed by Mr. Hilburn's staff. Neither MSF nor MSFC was "officially" involved in the original study. Dr. Mueller has requested that the gathering, review, and adjustment of data be conducted with the active participation and approval of MSF and the Centers. Furthermore, he has requested a "standardized" configuration study for Saturn V LEM and CSM in conjunction with the Apollo Cost Study Update. Norm Rafel's office will be responsible for this effort which will start in January and is expected to be completed by May 1. I have appointed Woody Bethay, with John Stucker as alternate, as the MSFC team leader for this study, and have asked Gen. O'Connor to appoint additional team members. We expect additional ground rules immediately for our review and comment. ✓

ADP MANAGEMENT STUDY - A request, for Dr. Mueller's approval, to Procure Management Engineering or Consulting Services for a study of the ADP area at MSFC was signed by Mr. Newby December 16, 1965. This request will be handcarried to Washington by Mr. Crouch on December 20 for discussions with MSF Management Operations personnel. ✓

ADMINISTRATIVE OPERATIONS BUDGET - Manned Space Flight Program Control Office has requested that we include certain positions from the Associate Administrator's reserve in the MSFC portion of the personnel planning data for the FY-1967 Administrative Operations Budget for the Congressional Volumes. The added positions are: 9 Excepted positions in FY-65, FY-66, and FY-67; 12 GS positions in FY-1965; 32 GS positions in FY-1966 and FY-1967.

The salary for these positions will be consistent with the Center's average salary for both the excepted and regular GS positions. Funding for these salaries will be lapsed out for each year.

H.M.
Too much
visibility ???
B

NOTES 12/20/65 REINARTZ

B 12/29

No submission this week. NS 12/20

NOTES - 12/20/65 - RICHARD

B 12/29

No submission this week.

JS 12/20

B 12/29

Q12/20

1. Program Control Center at S&ID - Reference your comment to Notes 12/13/65 Rudolph (copy attached). A Program Control Center will be established at S&ID similiar to GE. The Program Control Center will provided needed visibility to S&ID management to force needed program actions. Representatives from S&ID, Program Control will visit Huntsville tomorrow, Tuesday, 21 December 65, for orientation on Saturn V and GE Program Control Centers. Mr. Jim Murphy, Saturn V Deputy Manager for Management and Mr. Bill Sneed, Chief, Saturn V Program Control, will visit S&ID during the first week of January '66 to assist S&ID management in their efforts towards establishing a Program Control Center.
2. S-IC-T Stage - A captive firing (approximately 40 seconds duration) was conducted on Thursday, 16 December 65, primarily to test the on-board closed-loop LOX and Fuel Tank Pressurization Systems. All objectives were apparently met. This concludes the S-IC-T captive firing test program here at MSFC. ✓
3. S-IVB Dynamic Stage - Will be used for Super Guppy flight tests. Best estimate for initiation of these flight test is the middle of February '66. Firm schedule is dependent on finalization of NASA contract for the Super Guppy. ✓

Shes

I'd like to visit that new FE Control Center
Please arrange. B

Attachment: Notes 12/13/65 Rudolph (DIR, I-DIR & R-DIR's copy only)

NOTES 12/20/65 SPEER

B 12/29

JS 12/20

1. AS-201 SUPPORT PERSONNEL: A request for MSFC personnel to support AS-201 Launch Operations was received from KSC on 12/15/65. The request is for 11 R&DO people one of whom will be in the Blockhouse. Yourself, Gen. O'Connor, Mr. Weidner, and Col. James (Launch Vehicle Representative) are expected to be in the Blockhouse during Launch Operations. ✓ Also, it is desirable to have an additional MSFC man there as LIEF communicator. ✓ However, due to the extreme space limitations within the Blockhouse, the total MSFC attendance is not yet completely resolved with KSC. ✓

NOTES 12-20-65 Stuhlinger

B 12/29

1. PEGASUS: No significant changes. Impact tests at AEDC with high velocity particles on S-IVB tank wall samples gave the preliminary result that 0.16 mm Al projectiles required velocities between 3.6 and 5.0 km sec⁻¹ to penetrate the outer Al skin, but a velocity increase to 7.5 km sec⁻¹ still failed to rupture the fiberglass lining. Further tests are underway which are expected to provide sufficient data for a realistic estimate of the puncture probability of the S-IVB tank. AEDC has agreed to perform impact tests on small sample tanks filled with oxygen.

E.S.

→ You mean the interior L₂ heat insulation of the SIVB tank? B

2. AAP - LUNAR EXPLORATION: Following Dr. Mueller's recent comments on the LSSM, we prepared a 14-day scientific lunar surface mission which uses as a mobility aid an austere LSSM. Discussions were held with ASO, LSSM contractors (Boeing and Bendix), and OMSF representatives. We feel that a meaningful scientific 14-day mission with a simplified LSSM can indeed be carried out.

→ Request briefing B 12/29

EARTH ORBIT SYSTEMS: I met with Drs. Pieper, Bogges, and Hallam of GSFC to discuss possibilities of preparing astronomical projects with astronaut participation for early AAP flights. While the interest in such projects is great, it is not likely that any manned astronomical project can be developed in time for a 1969 or even 1970 flight. It is the feeling of GSFC astronomers that optical technology experiments in which basic problems of diffraction limited telescopes in space are studied would be very useful to astronomers. Members of ASO, Astrionics, and RPL are presently working on an optical technology experiment program for early AAP flights.

E.S.
I'd also like to chat with you about all this. Informal. Suggest just you and me B

3. ART/SRT AND SUPPORTING DEVELOPMENT FY-1966 PROGRAM STATUS:

	<u>Annual Plan</u>	<u>Program Authority</u>	<u>Processed To FMO</u>	<u>Obligated</u>
OART	\$16,154,000	\$15,654,000	\$6,405,545	\$ 754,407
MSF (904)	9,450,000	9,450,000	1,784,646	721,085
OSSA	5,903,000	438,000	308,071	1,000
OTDA	1,500,000	1,500,000	239,055	0
TOTALS	\$33,007,000	\$27,042,000	\$8,737,317	\$1,476,492

A number of tasks are presently under preparation in the Laboratories for commitment before December 31. We hope to have a substantial portion of the OMSF Program (904) committed by that time.

NOTES 12/20/65 WILLIAMS

12/20

B 12/29

1. Ed Gray Visit. Ed Gray and several of his personnel spent all day Tuesday, 12/14/65, with us reviewing our status and plans on the study program '65, '66, and '67, AAP activities, S-IVB Workshop, contracting methods and problems, and overall working relationships between ASO and his organization. In general, it was an excellent meeting. ✓ He was particularly pleased with the manner in which we are accomplishing the study program and the cooperative spirit which we have demonstrated, our progress on the Workshop and the material we have to present at the Management Council Meeting, and the close ties between ASO and the MSFC Purchasing Office and the way we are handling our contracts. ✓ The Purchasing people participated in the portion of the meeting on "Fixed price vs. CPFF contracts" and Ed will take the material we prepared and attempt to get us the flexibility we need for future contracts. ✓
2. Move to Building 4202. The "ex-FPO" personnel of the Advanced Systems Office will move from the 8th floor, Building 4200, to Building 4202 on Monday night, 12/20/65. This move and the move next week of the Digesu group will complete the ASO + co-located elements' move to Building 4202. ✓
3. Saturn V-Voyager. The Saturn V-Voyager payload shroud study is continuing with the first benchmark being a mid-January determination of approximate size constraints and capabilities which JPL/OSSA needs for the Congressional reviews in February. An internal review will be held the second week of January. Details to be announced later. ✓
4. Human Factors. Unofficially, Dr. S. Gerathewohl, OSSA-Bio-medicine, is interested in changing positions. With our interest in beefing up our Human Factors capability and the forthcoming activity in AAP dealing with astronauts and bio-medical type work, he may be a fine addition to the MSFC organization. ✓
5. I will be on annual leave for the next 10 days. In my absence Dr. Ruppe, and in his absence Bill Huber, will act in my behalf. ✓

Merry Christmas and Happy New Year*

Same
to all of you.

(*It's going to be a busy one - heading up MSFC's Bright Future.) ✓✓

December 1965

JTB 12/27

S-II-T Forward Skirt Removal was completed on December 19, 1965. Initial inspection indicates there is no structural damage to the forward bulkhead and only minor damage to the forward bulkhead insulation. The forward skirt has been moved to the S-IC Booster Storage Building and repair work has begun. All foreign material trapped under the membrane seal has been removed, bagged, and tagged for return to Downey Quality Assurance. Repairs to the S-II-T Lower Barrier Seal insulation is progressing satisfactorily. ✓

Cold Shock of the S-II/A2 facility LOX system using LN₂ was completed on December 19, 1965. ✓

Aetron Contract for installation of GSE for Test Stand A-2 and the Test Control Center terminates this month with some essential items remaining to be installed. Contractual direction will be provided NAA/ S&ID to complete the remaining installation. ✓

Program Operating Plan 66-1 is now being prepared and will be completed the week of December 27 for submittal to MSFC on January 7. This plan includes forecasts of support operating costs for the remainder of FY66 as well as FY67 through program run-out. A preliminary document of S&ID/MTF Support Requirements has been received and a review is now being made in support of POP 66-1. ✓

MTF Martin 404 Charter extension of three months until March 31, 1966, was approved by NASA Headquarters. Necessary action has been taken to amend the support contractor work scope accordingly. ✓

IAM's Bid for Representation among employees of Bird Fire and Safety Protection's firemen failed in an NLRB election on December 21, 1965. The vote was twelve to twelve tie. ✓

Approval of the "Use Tax" agreements reached with the Mississippi State Tax Commission has been received from the General Counsel, NASA Headquarters. Basically, it has been agreed that the State will not attempt to tax our cost-type contractors for services rendered, except in the "construction" area and for "rental" of equipment. There will be an impact, contractually, since in most cases taxes have not been paid for "construction" work by our primes and subs. How much will be determined? In the Video and Wismer-Becker situation, it will be 2% of the contract prices. These are the big ones. There are some minor ones, too. ✓

NOTES 12-27-65 BELEW

958 12/27

B 12/28

H-1 ENGINE Effort is continuing at MSFC and Rocketdyne in an attempt to identify the cause for the recent LOX seal failures. Tests are being performed at MSFC to establish physical characteristics of the carbon seal material at cryogenic temperatures. A modified seal which provides increased strength will be tested along with the new bellows seal. Rocketdyne is also conducting physical impact strength studies under cryogenic conditions.

It is anticipated that a solution for this problem can be established within the next two months and any necessary retrofit accomplished shortly thereafter. ✓

F-1 ENGINE During investigation of the turbine failure on turbopump E-2030 on December 10, ultrasonic inspection disclosed surface micro-cracking in the forged one-piece turbine manifold shrouds for engines F-5029 and F-5030. An ECP is being prepared requesting interim return to the 3 piece shroud configuration to allow time for a more complete investigation of the one-piece shroud failure and review of the manufacturing procedures involved. Program impact, if any, is being assessed.

Investigation of R&D engine 029 turbopump explosion on December 10 is underway. Even though complete results are not yet available, there is substantial evidence that the LOX pump was the source of initiation and that damage to other parts of the turbopump assembly resulted from the pump explosion.

Engine F-4028 (spare for S-IC-3) was accepted by the Government on December 21. Arrival at Michoud will be approximately one month ahead of schedule. ✓

RL10 ENGINE The Centaur ground test vehicle was successfully fired with RL10A-3-3 engines on December 17. The specific problem that caused diffuser malfunction and failed some thrust chamber tubes has not been determined. It is speculated that the engine and diffuser were misaligned or that there was a leak around the engine/diffuser joint. Since this was a ground test problem, no effort on the flight vehicles is expected.

An RL10A-3-3 engine which incorporates the performance improvement features has successfully completed specification vibration testing. Engine endurance firings will be the next step in substantiating these changes. ✓

J-2 ENGINE The prenegotiation conference with the NASA Headquarters incentive team, concerning the combination of the J-2 Contracts and acquisition of sustaining engineering, will be held at Marshall Tuesday, December 28. ✓

NOTES 12-27-65 CLINE

12/27 958

B 12/28

NEGATIVE REPORT

NOTES 12/27/65 CONSTAN

12/27 JFS

B 12/28

LTV TO PROVIDE COMPUTER SUPPORT SERVICES AT SLIDELL

Representatives from Ling-Temco-Vought (LTV) visited the Michoud Computation Office, Slidell, Louisiana, on December 22 and 23, 1965. This visit resulted from the announcement made on December 21, 1965, relative to the selection of LTV for final contract negotiation for computer support services at the Michoud Assembly Facility. ✓

NOTES 12-27-65 DANNENBERG

B 12/28

NS 12/27

NEGATIVE REPORT

NOTES 12/27/65 FELLOWS

9V8 12/27

B 12/28

1. S-IVB Panel Flutter and Acoustical Vibration Problems: As a result of the meeting with you on Wednesday, December 22, we have taken steps to set aside \$3 million and to support effort directed toward solving the S-IVB panel flutter and acoustical vibration problems. ✓ Approximately \$2 million is reserved for in-flight experiments on SA-507 and SA-508, and \$1 million for wind tunnel testing at AEDC. ✓ The panel flutter wind tunnel testing at Ames is expected to be conducted without expense to MSFC. ✓

2. R-OM Personnel Assignment: Mr. Edmond D. Messer, formerly of Executive Staff, has been appointed Chief of our Vehicle Support Office. In this capacity, he will direct the activities of our Vehicle and Stage Coordinators for R&D Operations support of the Apollo Program. Mr. Messer will be absent for about three months due to surgery and convalescence. During his absence, Mr. Charles Faulkner will act as Chief of the Vehicle Support Office. ✓

NOTES 12/27/65 GEISSLER

970 12/27

B 12/28

Negative report

B 12/28

NOTES 12-27-65 GRAU

958 12/27

Nothing to report this week.

NOTES 12/27/65 HAEUSSERMANN

B 12/28

978 12/27

MEMBERSHIP TO RESEARCH ADVISORY COMMITTEE ON CONTROL, GUIDANCE, AND NAVIGATION: Last year you persuaded Dr. Bisplinghoff to continue committee participation with members from all NASA Centers. Without prewarning, this year OART has limited membership to the NASA Research Centers. Obviously, the ERC-type policy continues.

→ W.H. and Herm. Weidner

Is there still time to do something about this? H. Weidner talked to McAdams recently about other ERC-related problems. Shall I take any action? B

NOTES 12-27-65 HEIMBURG

9/8 12/27

B 12/28

S-II BATTLESHIP (SANTA SUSANA)

Six unsuccessful attempts were made to get the first firing
(15 seconds) on the re-built stage between December 18 through
December 22, 1965. The fifth and only attempt resulting in engine
ignition was erroneously cutoff by engine No. 5 lox turbine overspeed
at 1.3 seconds from engine start. Gas generator valves had not opened
on this engine. The final attempt was abandoned before terminal count
and operations postponed until after Christmas weekend. None of these
difficulties represent major stage deficiencies, but concern getting
the bugs out after the major modifications.

Still a lousy record!
B

NOTES 12-27-65 HOELZER

97812/27

B12/28

ATOLL II DEVELOPMENT:

Development of the ATOLL II compiler is proceeding at a fast pace. Personnel assigned to the project are working 50 - 60 hours a week in an effort to keep on the current schedule. The complete system, including the on-line system, is scheduled to be ready for field testing by February 15, 1966. The language reference manual has been prepared, and a language primer is currently in preparation. Attention must now be focused on the need to train prospective users at Cape Kennedy, at the Astrionics Laboratory and at the Quality and Reliability Assurance Laboratory. It is important that the language and system receive the necessary backing by the using laboratories to implement its use on a reasonable schedule. ✓

Many problems and difficulties have been encountered in developing ATOLL II. These include logical flaws in the design work which was subcontracted, insufficient access to RCA 110A computers for program testing, and loss of key personnel. The personnel lost to the project have been replaced, however, and the other problem areas are improving. ✓

NOTES 12/27/65 JAMES

B 12/28

9/25/2/29
SATURN IB INCENTIVE CONTRACT STATUS: In view of Dr. Mueller's re-emphasis on the urgency of converting our contracts, we are attempting to move our negotiations to completion as fast as possible. ✓

For the S-IVB Stage, the negotiation position, as approved by Dr. Mueller, was forwarded to DAC the week of 6 December. Since then we have met with DAC to answer details on the government position. DAC is now preparing a counter proposal and we expect to resume negotiations during the week of 3 January 1966 with a mid-January target date for arriving at a negotiated position. ✓

For the S-IB Stage, we will meet with Col. Seccomb, Dan Linn and other headquarters personnel on 29 December to provide them with our recommended pre-negotiating position. It is expected this will then be presented to Dr. Mueller by Mr. Linn so that we can get on with completing our negotiations with CCSD. ✓

SA-201 FLIGHT READINESS REVIEW: The SA-201 FRR is now scheduled for the week of 10 January 1966. The written report for this review is in reproduction and should be ready for forwarding to headquarters by 3 January. ✓

VLF-34: All mod kits known to be mandatory for SA-201, ~~except for two engraving lenses (at G.E. for shipment)~~, have been shipped to KSC. These have been installed. The spacecraft has been stacked and KSC plans to apply power at noon today. ✓

VLF-37B: Forty-two panels of integration ESE have been shipped to KSC. Six panels were retained at Daytona for incorporation of E.O.'s prior to shipment. Approximately 300 cables and 5 battery racks were shipped to KSC from the vendor. It appears that G.E., Daytona, will meet or beat the 1 February completion date for VLF-37B. ✓

RCA LOGISTICS CONTRACT: The RCA logistics contract to support the 110-A computers had not been approved by Mr. Webb as of last Friday. This contract has been in Washington since November. ✓

NOTES 12-27-65 KUERS

B 12/28

12/27

Superinsulation R&D: The first large scale application of Linde's pre-evacuated multiple-layer insulation of Al-foil and glass fiber paper (70-inch tank) was unsuccessful because a flexible vacuum jacket could not be manufactured to the extremely low leakage requirement (pinholes and sealing of structural and plumbing penetrations).

The next step was the elimination of the vacuum requirement during ground holding time, by going to a Helium purged system and multiple wrinkled aluminized Mylar foil (NRC).

This simplified the engineering problems, and a 105-inch tank has been successfully tested under ground hold conditions and is now being prepared for space environmental testing--but the efficiency is lower and the outgassing in space is a problem because of formation of small Helium pockets between the vent perforations of the layers. Therefore the pre-evacuated Linde concept was continued as a components development program, and promising solutions of structural and plumbing penetration problems have been worked out. The pinhole problem of the flexible vacuum bag was practically eliminated by the development of a lead-Mylar laminate. The lead layer does not work harden at low temperatures as Al-foil does, and "three-corner wrinkles" do not show the trend of forming tiny holes. (Linde is using this material now commercially in pre-evacuated superinsulation pads, guaranteeing the vacuum for several years.) ✓

A second 105-inch tank with the advanced pre-evacuated system is almost completed, and testing will start at P&VE in January.

The first 70-inch tank is being reused as a large scale test bed for a promising composite insulation system of sealed cell Mylar Honeycomb and wrinkled aluminized Mylar.

All these superinsulation schemes must be protected from aerodynamic loads and meteoroids by a shroud. The structural solution for the integral tank wall, which does everything, still has to be invented.

Merry Christmas and Happy New Year!

Same to you
B

W.K.

Request a

45-min

briefing

with

samples,

pictures

and

overall

plan

B

(Please

arrange

thru

Bonnie)

NOTES/12/27/65/MAUS

B 12/28

9/28 12/27
IN-FLIGHT EXPERIMENTS - Reference is made to your comments to my 12/13/65 NOTES (copy attached) and to Dr. Mueller's letter to you regarding the In-Flight Experiments. The letter dated November 23, 1965, provided \$2.0 million and \$0.9 million for FY-66 and FY-67 respectively for in-flight experiments.

Dr. Mueller's letter provided funds only for the Apollo experiments which have been approved for flight or feasibility studies by the MSFEB. In the last budget submission, the Center requested funds in the amounts of \$10.3 million and \$22.8 million for FY-66 and FY-67 respectively for the Center's total Apollo in-flight experiments program. This included all experiments under consideration for possible assignment to Apollo flights. We do expect additional funds to become available as the experiments progress through feasibility studies and get flight assignments.

H.M.
Let's discuss the wisdom of this distinction within MSFC B
The \$2.0 million approved is from the Apollo Program for experiments to be flown on Apollo flights as opposed to AAP experiments which will come under Dr. McCall's purview. A permanent solution, which is also under study, will provide a plan to include both the Apollo and AAP experiments.

The experiments presently approved will be flown on Saturn IB flights; therefore, the funding provided by Dr. Mueller was included under the IB account. Col. James has appointed Mr. Dan Germany as his coordinator for the IB experiments. \$1.6 million from the IB account has been provided to R&DO to initiate the required procurement actions on the approved experiments. R&DO will, of course, provide the technical management for development of the experiments. R&DO has provided guidelines to the technical supervisors in the labs for initiating action to implement the experiments. The procurement documents are presently being prepared. To date, no initiations have been recorded in FMO against the \$1.6 million.

We will continue to keep you informed of the status of the Apollo Experiments Program as new developments occur. ✓

REVIEW OF CONGRESSIONAL MATTERS - On December 21 and 22 discussions were held in Washington with Mr. Wilson of the Manned Space Flight Subcommittee and Bob Freitag concerning upcoming congressional planning. Mr. Wilson indicated that a Committee visit to MSFC this year is a 90% probability. Freitag's shop is preparing position papers and drafts of testimony which will be available to the centers when finalized. A memo on Mr. Wilson's comments concerning AAP has been sent to key MSFC officials. ✓

NOTES 12/27/65 REINARTZ

B 12/28

9/8 12/27

As of noon Thursday Dr. Mueller had not approved the Procurement Plan for the LEM integration effort. If approval is not established by December 30 the whole procurement schedule must be delayed. This office is staying in daily touch with Washington on this matter. ✓

NOTES - 12/27/65 - RICHARD

95812/27

B 12/28

No submission this week.

NOTES 12/27/65 RUDOLPH

B 12/28

9/312/27

1. S-IC-F Stage - will be prepared for shipment during the early part of January 1966 in time to arrive at KSC by January 21, 1966 (on schedule). ✓

2. S-II Battleship Stage - The following is a chronological listing of significant events occurring in the S-II Battleship Stage Test Program during the month of December 1965:

- December 18, 1965 - Special LOX recirc test conducted, proving that natural LOX recirc is adequate to provide acceptable LOX pump inlet temperatures for the S-II Stage.

First attempt to fire S-II Battleship Stage with Flight Configuration Engines was terminated due to a shorted cable harness on Engine #2.

- December 20, 1965 - Second attempt to fire S-II Battleship Stage was terminated due to apparent inability to attain required inlet temperature to fuel pump on Engine #5. Failure was attributed to a transducer which did not measure liquid hydrogen temperature accurately.

- December 21, 1965 - Transducers replaced and three test attempts made:

1st attempt - Automatic cut-off received when recirc cut-off signal failed to complete ready logic.

2nd attempt - Automatic cut-off due to loss of hydraulic pressure in actuator lines.

3rd attempt - Cut-off at ignition caused by a false pump over-speed indication.

A 15 second firing is scheduled for tomorrow, Tuesday, December 28, 1965.

What an impressive record!

B

NOTES 12/27/65 SPEER

B 12/27

KB 12/27

1. AS-201: AS-201 Launch Mission Rules were signed by representatives of all three Centers and sent to publication on Friday, December 17. It is expected that copies will be received by this Office on December 27 for distribution within MSFC. ✓

2. FLIGHT OPERATIONS PANEL: The status of panel activities was reviewed by the Panel Review Board on 12/20/65. ✓

B 12/28

AS 12/27

1. AAP LUNAR SURFACE PROBE: In response to your question on my Notes of 12-13-65 (copy attached) regarding the use of existing missiles for lunar surface probes, the following information is furnished:

The concept of launching unmanned probes from an Apollo lunar orbiter to the lunar surface was originated by MSC for site certification purposes. However, as now planned, these probes are to be justified as scientific packages for supplementing the scientific exploration of the moon. This use imposes limitations on the impact velocity and "g" loading of the probes. Preliminary studies at MSC have favored a relatively hard landing capsule (total separation weight 1124 pounds; capsule payload 350 pounds; impact velocity 50-75 fps; 400 "g" loading) over a soft lander, such as a modified Surveyor. The impact velocity constraint makes the use of existing military guided missiles impractical. The following advantages are cited in favor of lunar survey probes (LSP):

(a) Eight or more probes can fly per earth launch (mounted to the sides of a LEM descent stage or on a special rack. The CSM is docked to the LEM or the rack as in a LEM landing mission);

(b) They can be dropped in places that are inaccessible to man (high inclination - polar orbits, far side of the moon, hot-spot areas, etc.); and,

(c) They can have a life span of more than one year, transmitting data either to Apollo lunar orbiters, unmanned lunar orbiters, or directly to earth if they are placed on the near side of the moon.

The Ad Hoc group consists of representatives from OMSF, OSSA, MSC, MSFC, Langley, and JPL. A cooperative plan between the various agencies involved has been delineated leading to a PDP by next July. MSFC may be called to offer input relating to interfaces between extended lunar surface missions and LSP's. Although originally aimed at Flight 511, it is presently anticipated that LSP's with scientific payloads will not be able to be readied before 1970. If the LSP's are to be implemented, then something else will have to "give"; obviously our total program is bounded by fiscal restraints. ✓

WILLIAMS NOTES 12-27-65

3 12/28

9/8 12/27
VOYAGER-SATURN V: OSSA announced last week a major change in unmanned planetary programs. The previously planned 1971 Voyager-Saturn V mission has been dropped leaving 1973, at the earliest, as the first mission attempt. A few flights of modified Mariner spacecraft will be flown to fill in the gap. The previous Voyager-Saturn V plan, based on 1971 first launch, called for initiation of Phase "C" in the Spring of 1966. Until we get further information and guidance on the reoriented Voyager-Saturn V schedule, we will proceed as follows:

a. Proceed as planned with the study initiated to determine Saturn V shroud-size capabilities and restrictions under various wind conditions. This work is scheduled for completion in March-April 1966, with a midterm review in mid-January.

b. Hold back on preparations for Phase "C" activities, including formation of a complete Engineering Implementation Panel. ✓